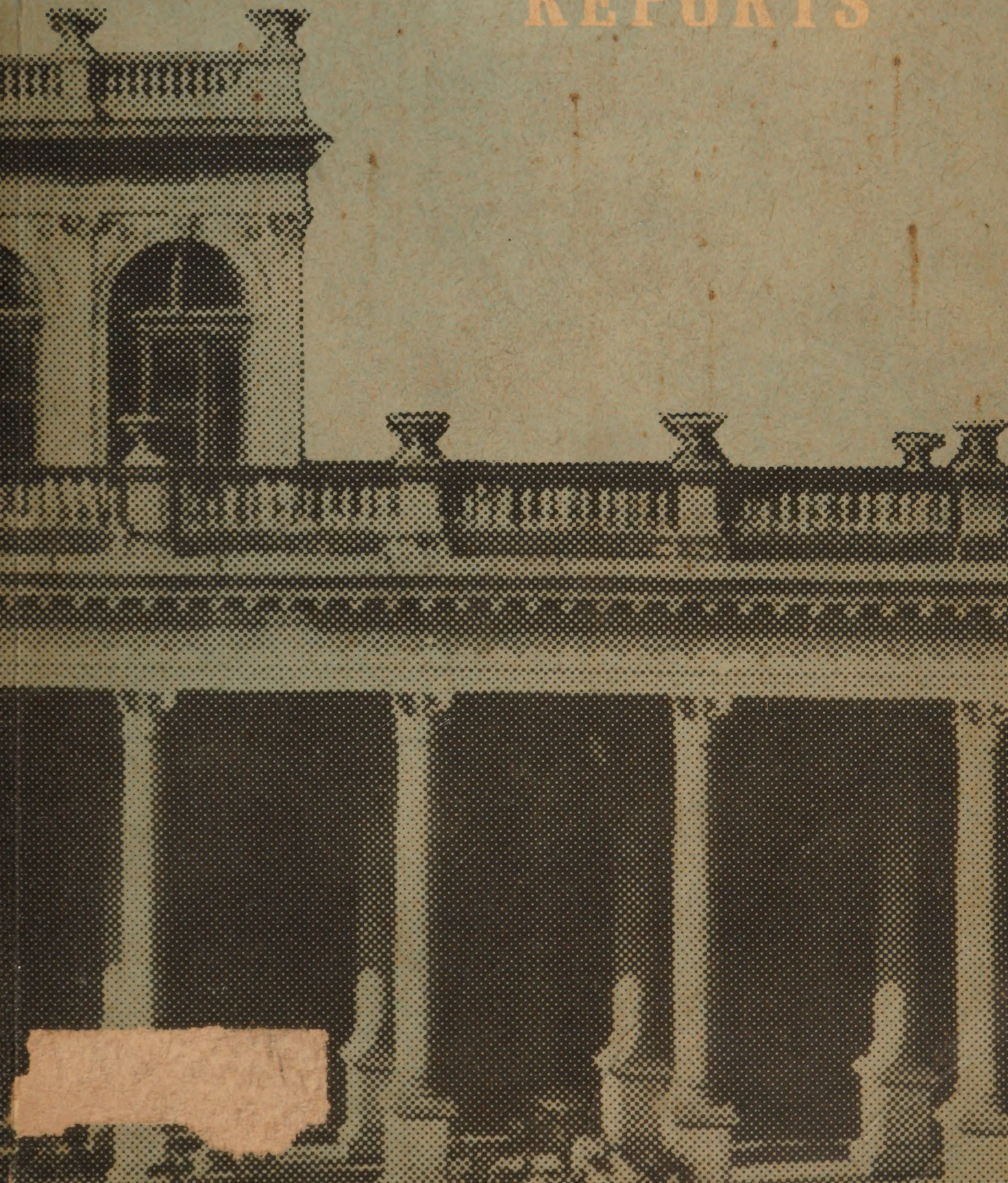


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Balneological Treatment after Operations of the Gastrointestinal Tract

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Spa treatment plays an important role in modern rehabilitation of patients who underwent surgical treatment of the diseased digestive system. The number of these patients arriving at our spas represents over 30 per cent of the patients with gastroenterological indications taking the treatment. That is why the rehabilitation of post-surgical cases in our spas is an important question facing our health care and the objectivisation of spa treatment is a permanent requirement of modern balneology. By rehabilitation we mean a facilitation of the adaptation of the organism to new post-surgical conditions, the renewal of the correct physiological rhythm and the establishment of positive reflexes with the aid of all the means which are at the disposal in spas. These are natural therapeutic sources and a great variety of physical therapeutic stimulants (1).

The balneotherapeutic method of treating conditions after surgery of the digestive system consists in the application of a relatively wide complex of therapeutic factors, with the protective therapeutic regimen of the spa ranking among the most important parts of the whole complex. As regards the specific factors of such spas as Karlovy Vary (Carlsbad), Bardějov and Korytnice, specialising in the treatment of these conditions, the drinking cure of their mineral springs should be added to the list as the most prominent factor (2). The Karlovy Vary mineral springs are hydrocarbonate-sulphato-chloride thermal springs with a relatively small carbondioxide content. In spite of containing sulphate ions which play a prominent part in the influence of this mineral water on the liver (this is a choleric, detoxicating, glycogenopectis effect), they have no strong purgative effect. Very important is the anti-inflammatory and anti-allergical effect of this mineral water which is mainly due to its calcium contents, the effect of which is particularly striking in patients after surgery. The secretion of the upper part of the

digestive system is influenced not only by the above-mentioned chemical components (3) also by the CO₂ contained in the mineral water. The temperature of the spring together with the other minerals contained in it counteracts local spasms of the digestive system and adjacent organs and in this way contributes in renewing the disturbed functions.

No less important are the other therapeutic factors, such as the diet regimen which is considered a prominent therapeutic factor, the total as well as local application of thermotherapy, hydrotherapeutic procedures and remedial exercises. Medication is also added into the complex of therapeutic procedures wherever this is indicated.

Our information will deal with conditions after stomach resection and after cholecystectomy. In the first part of our information we evaluate the short-term effect of spa treatment on patients after stomach resection which makes itself felt already during the patients' stay in Karlovy Vary. We followed an ad-hoc selected group of patients in one of the numerous spa institutes at Carlsbad (Karlovy Vary). The indices determining the general state of these patients were the changes in their body weight and post-surgical complaints. The dyspeptic difficulties of patients after stomach resection are only a fraction of the complaints generally voiced by these patients, nevertheless their role is of considerable importance considering the nourishment of the patient, their food tolerance and their general condition.

A survey of the individual complaints at the initial stage of the treatment and before patients' return home is given in table 1. In our group of 151 patients after stomach surgery one third of them suffered from pressure and epigastric fullness with tympanism, lack of appetite, sleeplessness and pyrosis. Nausea with occasional vomiting, particularly in the morning and after the main meals was recorded in about one fifth of all patients. Almost one third of all the patients suffered from pains and epigastric pressure after meals.

Table 1

Dyspeptic complications	At arrival	Before return home		
		improved	slightly improved	no improvement
Epigastric pressure and feeling of fullness	36.0 %	22.8 %	7.9 %	5.3 %
Tympanism	32.0 %	24.5 %	4.5 %	4.0 %
No appetite	19.0 %	11.2 %	1.3 %	6.5 %
Pyrosis	20.5 %	18.5 %	—	2.0 %
Gallbladder pains	4.5 %	1.9 %	—	2.6 %
Eructations	3.3 %	2.0 %	—	1.3 %
Nausea	20.5 %	14.0 %	—	6.5 %

In the same group we also followed body weight upon arrival with a view to the time elapsed since surgery. A total of 106 patients was below their average weight, i.e. two third of the group under observation.

The greatest increase in weight after spa treatment was recorded in the lowest weight group and was 1 kg on the average.

From this it is quite apparent that a correct nutrition plays a particularly important role in the post-surgical care for the patients, particularly a correct dietary regimen, which rids patients of their most troublesome complaints and thus allows an efficient rehabilitation. The dietary regimen at the spa plays an important role since its task is to teach patients the observance of the principles of their diet and educate them to continue observing these principles even after their return home. That this effort is successful can be seen from Table 2. It was established that only 50 per cent of patients after stomach surgery who were sent for spa treatment for the first time observed the correct diet, 22 per cent did not observe any diet whatever and an uncertain reply to this question was received from 28 per cent of the patients. Patients who had been treated in spas before were observing a proper diet in 64 % of all questioned after stomach resection was performed on them.



We hold the view that the dietary regimen of patients after surgery as applied in our spa sanatoria is fulfilling its task facilitating a speedier and more effective rehabilitation of patients after stomach resection. In order to enable a full display of this rehabilitation it is advisable to start as soon as possible (4, 5). That is why patients after stomach surgery are sent for spa treatment within six months after their operation on a priority basis and in the new list of indications for spa treatment (1963) it is suggested that this period should be reduced to 4 months, making possible the closest possible continuity of the period of realimentation following immediately after surgery and the period of recovery during spa treatment.

Table 2

After stomach resection	Patients observing diet	No diet	Uncertain reply
In Karlovy Vary for the first time	50 %	22 %	28 %
Repeated stay in Karlovy Vary	64 %	21 %	15 %

Since there have been very few papers hitherto dealing with a long - range observation of spa treatment and its effects on patients after stomach surgery (6) we have devoted the second part of our information on patients after stomach resection where a long period was allowed to elapse since their last spa treatment averaging about 14 months. The investigation was carried out by questionnaires which were sent to 115 patients. Although the importance of balneologic procedures for the rehabilitation of patients after stomach surgery was greatly underestimated in the past, we established better results in the group of patients who had been treated before in Karlovy Vary Spa than in the control group who had not been treated at any spa before. Possible negative results of spa treatment of these conditions are mainly due to the fact that these patients' documentary case evidence was very incomplete or that they were sent for spa treatment with unsuitable indications. If the treatment is to bring success the doctor at the spa must know whether the resection performed, on the patient was of Billroth type I or type II and the size of the operation since the type of operation often influences the incidence of post-surgical complications. In many cases this information is missing in the recommendation of spa treatment. The doctor must also know the permeability of the neopylorum or anastomosis just as he must be informed on the function of the afferent and efferent loop and possible accompanying defects of the other organs of the digestive system, such as the gall-bladder and the pancreas.



Table 3

	Type I		Type II	
	control	Karl. Vary	control	Karl. Vary
Frequent postprandial complaints	47.0 %	44.8 %	70.5 %	61.5 %
Diarrhea	29.4 %	20.6 %	41.1 %	28.8 %
Vomiting bile	52.9 %	10.3 %	47.0 %	30.7 %

Table 3 indicates the distribution of patients according to their complaints in the group taking the treatment in Karlovy Vary and the group which was not treated at any spa. The relatively higher percentual values are due to the fact that in order to avoid subjective mistakes in the evaluation of the incoming questionnaires we entered difficulties ranging from the smallest to the most serious in the individual groups. The values correspond to the Müller and Štuřík statistics. Frequent postprandial difficulties of the dumping syndrome type (7) were recorded in patients who underwent stomach resection of Billroth type I a much less than in those who had passed type II resection which is in full correspondence with the generally known frequency of these difficulties. Nor were any substantial changes recorded in this group during the spa treatment. In patients after stomach surgery of type II the incidence of difficulties is considerable larger and improvements after spa treatment were also recorded in this group. We know that the basis for this type of difficulties are not any common causes and that these complaints have a tendency to become less violent until they gradually disappear within several years. It is exactly in the lighter disturbances that a speedy improvement can be achieved and a long-term tracing of these cases reveals that there are improvements in a greater number of patients who underwent treatment in Karlovy Vary than in patients of the control group. In serious cases of the dumping syndrome spa treatment is just as ineffective as the treatment with medicaments. Of the known factors which play their part in causing this syndrome the drinking cure can favourably influence jejunitis and anastomitis (8). It was established that a Fe deficiency (9) causes an increased intestinal sensitivity. By influencing the inflammation of the mucous membrane with mineral water and in doing so facilitating the adsorption of Fe we help eliminating this defect. The reduced level of Ca and K in the period of postprandial disturbance is another well known factor. Although we are well aware that an isolated administration of K does not as a rule prevent the occurrence of disturbances, it is still possible to suitably counteract them by administering the drinking cure as part of the treatment of the complex causes of this disease (Karlovy Vary mineral waters contain 6.46 millival Ca and 2.31 millival K).

In another group the incidence of diarrhea was evaluated. In this complex we included diarrhea caused by the above-mentioned reasons

(10) including achlorhydric diarrhea. These difficulties were also much more frequent in patients who had been operated according to type II and this group also achieved a striking improvement after treatment in Karlovy Vary. The main component of the treatment which can influence these defects is the drinking cure (11). The Karlovy Vary mineral water influences the stomach secretion by its mineral contents and by its CO₂. In cases where the temporary defect in the secretion is caused by post-surgical gastritis and anastomositis (12) hot mineral waters have a very favourable effect by their anti-inflammatory and mechanic influence. Many authors describe the variation of the bacterial flora of the stomach after surgery as the cause of the dyspeptic disturbances. The upper parts of the digestive system are penetrated by *b. coli*, *Proteus vulgaris* and enterococci, whose metabolites irritate the mucous membrane of the stomach (13). The drinking of suitable mineral waters can positively influence this disturbance.

In the last group the vomiting of bile was evaluated as an expression of duodenobiliary dyskinesia which in Billroth type II also includes the afferent loop. The pronounced improvement is explained by the intensive effect of the Karlovy Vary springs on the activity of the bile ducts and choleresis. In operations of the type II the results are somewhat less striking which is due to the defective function of the afferent loop. Balneological treatment plays a very significant role since defects in the function of contiguous organs (14, 16) such as the gall-bladder and pancreas is very frequent in post-resectional cases even before the operation is performed; after the operation these defects are more pronounced. The drinking cure with its favourable effect on choleresis and hormones of the digestive system contributes towards restituting normal conditions.

Table 4

Changes of body weight	Type I		Type II	
	control	Karl. Vary	control	Karl. Vary
increase	11.7 %	20.0 %	11.7 %	24.0 %
+10 kg	29.4 %	24.0 %	29.4 %	14.0 %
+5 kg	11.7 %	20.0 %	11.7 %	8.0 %
+2 kg	17.6 %	8.0 %	5.8 %	12.0 %
0	0	0	11.7 %	16.0 %
−2 kg	17.6 %	8.0 %	11.7 %	6.0 %
−5 kg	5.8 %	4.0 %	0	6.0 %
−10 kg	5.8 %	4.0 %	11.7 %	12.0 %
more	0	4.0 %	5.8 %	2.0 %
Average weight increase in kg	2.8	3.5	2.3	3.5

The indicator of the general condition of patients followed 1—2.5 years after surgery was the evaluation of changes of patients' body weight (15) in all the observed groups as can be seen from table 4. Besides recording a considerably higher average weight increase in patients belonging to the group who had already taken balneologic treatment in Karlovy Vary we also found a greater percentage of patients where higher weight increases were recorded as compared with their body weight before surgery.

Conditions after cholecystectomy

There is not enough processed material on the rehabilitation of patients after cholecystectomy in Karlovy Vary in spite of the fact that many excellent results have already been achieved. Our observations are based on the works of P r u š á k (17) and J o a c h i m (18) and on the views published by H a v r á n e k and F r i e d (19).

The Karlovy Vary drinking cure supplement by other therapeutic procedures eliminates a number of dyspeptic complaints many of them already within the first week of balneologic treatment. Table 5 contains information on 260 patients who were kept under observation. Patients who underwent spa treatment after more than one year after cholecystectomy are generally having more complaints than patients undergoing balneologic treatment after cholecystectomy, while they are later treated for outlasting complaints. Epigastric pressure and tympanism subside in both types of patients with the same ease.

Table 5

	Conditions after cholecystectomy			
	up to 1 year after operation		over 1 year after operation	
	treatment		treatment	
	before	after	before	after
tympanism	46.0 %	5.0 %	72.0 %	13.0 %
epigastric pressure	51.0 %	11.0 %	73.0 %	17.0 %
right substocal pains (dyskinetic)	41.0 %	51.0 %	65.0 %	28.0 %
nausea and vomiting	10.0 %	12.4 %	25.0 %	0.3 %

The direct effect of the Karlovy Vary treatment on dyspeptic complaints of patients after cholecystectomy pains in the right subcostal region improve well only in patients who are over one year after stomach resection, other patients in contrast to the above-mentioned group seem

to suffer from them more frequently. This may be the possible result of an increased choleresis in the surgical dyskinesia of the bile ducts. This is most probably connected with the question of nauseous conditions and vomiting. The drinking cure also adapts the frequency of the bowel movement. Constipation was listed before the treatment by 26 per cent of the patients, no adaptations of the bowel movement were recorded in only 3 per cent. Other irregularities in their bowel movement (a tendency to diarrhea and varying defecation) were listed by 16.7 per cent of all patients and in over half of these a normalisation was achieved in the course of the balneologic treatment.

In the complex of post-surgical functional rehabilitation of the patients treatment of obesity is also included. In the 260 patients under observation there were 38.5 per cent obese (i.e. over 10 per cent above the ideal weight according to Broca formula).

The long-range effect of the Karlovy Vary treatment in conditions after cholecystectomy was followed by questionnaires sent to patients after whose balneological treatment in Karlovy Vary at least one year has elapsed. The control group was comprised of patients operated at the surgical ward of the Karlovy Vary hospital at least one year before the questionnaires were sent and who were not sent for balneological treatment to Karlovy Vary. We are fully aware of the limited possibilities of the questionnaire action. The patients were divided into four groups:

1. without complaints,
2. nondescript biliary complaints,
3. with partial choledochus syndrome (biliary colics without icterus and febrility, or mere subfebrility without colic),
4. with complete choledochus syndrome (biliar colics, followed by icterus or febrility).

In all patients of the 3rd and 4th group we followed colics only in the first quarter after cholecystectomy and repeated colics were also followed at a later stage since the possibility of a spontaneous adaptation is known from literature and can be explained by the the expulsion of granules from the biliary ducts or by dyskinesia. In the control group there were 74 patients, three quarters of whom belong to group 1 and 2 and every third patient of the remaining quarter had isolated biliary colics in the first three months after cholecystectomy which did not reappear at any later stage.

Table 6. represents the long-term effect of the Karlovy Vary balneological treatment of patients after cholecystectomy. Part of the explanatory notes is contained in the text, the figure contained in the denominator of the fractions represents the absolute number of bilingraphically established cases of choledocholithiasis. The symbol "4:6" for example means that biliary colics were recorded in the first three months after cholecystectomy in 4 patients and in 6 patients it also reappeared at later stages.

Karlovy Vary treatment after cholecystectomy

		A1	A2	A3	A4	Total	%
No	set I	36	20	10 4:6	2:6 2:6	74	100
	%	65.7			34.3		
	B1	13/1	4	—	—	17	81
	B2	—	35/2	20/2 3:17	11/1 1:10	66	
YES	B3	—	4/1 0:4	7/1 0:7	—	11	19
	B4	—	1 0:1	1 0:1	8/3 0:8	8	
	set II	13	44	28 3:25	19 1:18	104	100
	%	55.3			44.7		

The actual set of patients who underwent balneological treatment is composed of 104 patients who filled in our questionnaire (two cases where information was received that the patients had died without any further explanation were not included).

Patients are twice divided into groups — one division is according to the course of the disease prior to the Karlovy Vary spa therapy (subdivided into A1—A4) and the second division was according to the course of the first Karlovy Vary treatment (subdivision B1—B4). Half of the set is in the left quarter on top of table 6. These are patients who never had any outspoken troubles after cholecystectomy. But in their group there are also 3 patients with a clinically concealed but choledocholithiasis was confirmed by cholangiography. The other subdivisions are noted individually :

A2—B3: two patients had isolated biliary colics immediately before the termination of the first Karlovy Vary treatment and in two other cases there were repeated colics (in one of them choledocholithiasis was proved).

A2—B4: this women patients suffered from one biliar febrile colic in the puerperium. Three years have passed since the operation and before her last pregnancy she was twice treated in Karlovy Vary.

A3—B2: a numerous subgroup of 20 patients who after the Karlovy Vary treatment had no more biliary colics. In 2 of 7 examined by cholangiography choledocholithiasis was diagnosed.

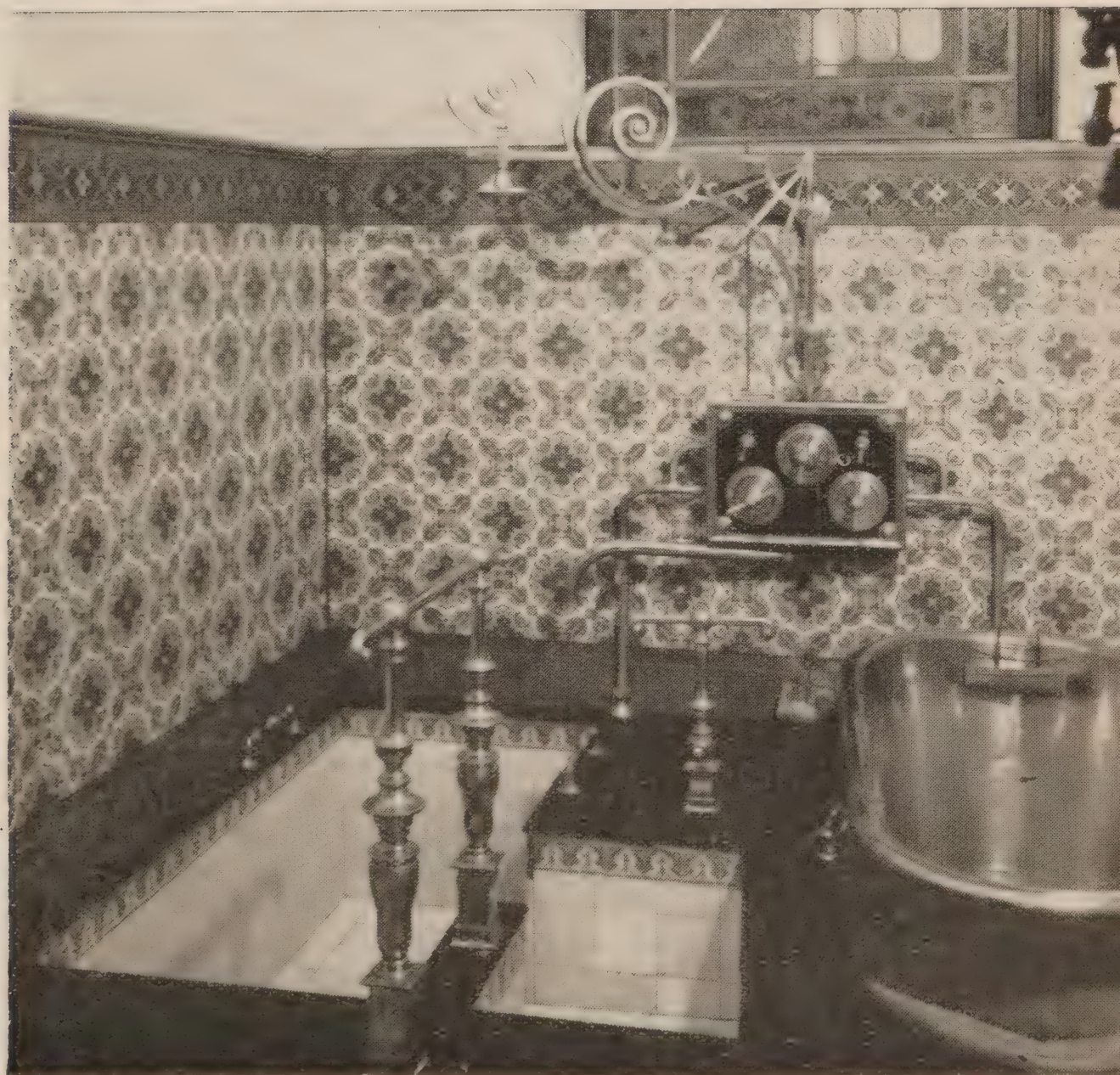
A3—B3: failure of the treatment in one patient with choledocholithiasis established by X-raying; there are repeated colics of the same type.

A3—A4: A women patient wiht chronic relapsing pancreatitis, un-
influenced by the Karlovy Vary treatment; the last colic was febrile, no
biligraphy was carried out.

A4—B2: biliary colics disappeared after the Karlovy Vary treatment
in 13 patients, 10 of whom were examined cholangiographically; stenosis
was diagnosed in three cases and choledocholithiasis in one patient.

The subgroup A4—B3 is not represented by any patient. No situation
arose therefore that colics reappered after the Karlovy Vary treatment,
but the accompanying icterus or fever disappeared.

A4—B4: failure of the cure; colics lasting from several minutes (4
times) to several hours (4 times) keep reappearing. Choledocholithiasis



was confirmed by cholangiography in 3 cases, the examination could not be concluded in one case as the application of biligraphine caused a biliar colic. Another patient also represented an interesting case during his biliographic examination there was a leakage of contrast bile which speedily disappeared into the duodenum without revealing the bile duct on the roentgenogram. Repeated cholangitis may have been caused by duodenobiliary reflexes in the periportally involved bile ducts. While four of the remaining seven patients had been treated in Karlovy Vary repeatedly (2—6 times) without results, this patient had also been treated in Karlovy Vary before and only after the fifth time did his complaints disappear completely. So we see that in half of the patients there was no dramatic improvement after the Karlovy Vary treatment as these patients did not suffer from any more serious complaints. In 5 cases biliary colics were recorded only after the first Karlovy Vary treatment following cholecystectomy, and the Karlovy Vary cure failed to prevent the occurrence of colics at later stages (in one case choledocholithiasis was diagnosed).

Out of 47 patients (representing 44.7 per cent of the examined set) with post-operative biliary colics two thirds achieved a marked improvement after the first Karlovy Vary cure and the colics were eliminated, in the remaining third the treatment failed to achieve improvement. We do not regard the achieved improvements as results of spontaneous developments since these patients after cholecystectomy suffered from repeated colics ten times more frequently even after the first quarter than only from isolated colics in the first quarter after cholecystectomy.

Only a minority of the patients underwent biliographic examination and that is why we only quote absolute numbers of diagnosed choledocholithiasis. Among the cases where the treatment failed to achieve improvements, choledocholithiasis is quite frequent, but in the set of patients there are quite a number of those with clinically latent choledocholithiasis and patients where a remission was achieved by the Karlovy Vary treatment. In these latter cases there is reason for justified doubts as to the duration of the remission. Our results nevertheless correspond with the unpublished results achieved by Joachim (18), to the effect that the Karlovy Vary treatment in conditions after cholecystectomy is effective in cases where there is something to cure and does not seem to be effective as a general therapeutic measure. In choledocholithiasis the Karlovy Vary treatment may well result in a remission but it may just as well fail to achieve any improvement. We are in full agreement with Niederle (20) and Joachim (21) that a carefully balneological therapy is not contraindicated since it may flush out small calculi. But in cases where the treatment results in a remission this should be concluded definitely (by surgery). The achieved remission should not serve as a reason for postponing surgery. In cases where the Karlovy Vary treatment does not lead to a remission it should not be repeated and this statement is proved by the case history of our patients in subgroup A4—B4. In cases where there are relapsing colics without

the diagnosis of permanent obstructions in the bile ducts a repeated application of the Karlovy Vary treatment is worth considering.

Conclusions

1. The Karlovy Vary complex treatment is very effective component in bringing to fruition the therapy of patients after stomach resection, cholecystectomy and other operations of the bile ducts.

2. In the course of the Karlovy Vary treatment of patients after stomach surgery and cholecystectomy some dyspeptic complaints already disappear.

3. In long-term observations of patients after stomach resections the positive effect on complaints connected with postoperational syndromes, postprandial diarrhea and duodenal dyskinesia was substantiated. Patients treated in Karlovy Vary had considerably higher increases of average body weight than the control group.

4. A marked effect of the long-range influence of the Karlovy Vary treatment was recorded in patients with relapsing biliary colics after cholecystectomy, in the majority of these patients the colics did not reappear. Only in a minority did the treatment fail to bring results.

5. In patients with relapsing colics an X-ray examination of the bile ducts should be made prior to the Karlovy Vary treatment. In cases of biliary obstruction where the Karlovy Vary treatment did not bring any remission, it is not advisable to repeat it. Where this remission is achieved by the Karlovy Vary treatment it should on no account represent the reason for postponing surgery.

Summary

The authors investigated the immediate and long-term effect of spa treatment in Karlovy Vary in patients after gastrectomy and cholecystectomy. A new contribution to the problem is the methodological approach focussed also on patients some time after the operation and on control groups of patients who did not have spa treatment. The authors investigated subjective and objective indicators such as dyspeptic disorders and changes of body weight. The authors presented evidence of the favourable effect not only on immediate complaints but also on the prevention of late postoperative sequelae. The work provides convincing evidence of the favourable results of correctly indicated comprehensive spa treatment.

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The normalisation of the content of bilirubin in the serum of patients with chronic hepatitis and liver cirrhosis as a result of the Karlovy Vary drinking cure

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Balneology represents a special therapeutic branch. Although it bases on the findings of biophysics, pathological physiology etc., similarly to other clinical branches, it still remains the foremost task of balneologic research to discover the scientific motivation for therapeutic actions. And can there be a more suitable means to achieve this end than clinical observation? This does not mean, however, that this always represents the shortest road, leading to the target very quickly — i.e. to a well founded therapeutic method. But every contribution towards a causal therapeutic method, even if it is of the tiniest significance, can only be considered a brick fitting into the great building of the balneologic system and helps us advance another step towards a concrete therapeutic method which is generally applicable.

The difficulties connected with evaluating clinical and statistical data in our branch has been ingeniously presented by Schmidt-Kessen. His claim that the results of a short stay at the spa are not always convincing and can not always be reproduced is unfortunately quite correct. It is impracticable, in his view, to rely on the effectiveness of certain therapeutic methods if there are no control groups of patients suffering from the same disease who have been treated by other methods which have brought less satisfactory results.

His demand for secondary circumstances and factors for comparing the therapeutic results is also fully justified, not to mention the desirable "unity of place and time".

In spite of this it would be ill-advised, however, to take a pessimistic view and that is why everything designed to bring more light to the dark spot around the theory of the effects of the spa therapy, in balneotherapeutic practice and literature must be carefully examined and tested without prejudice or bias.

Some time ago it was my good fortune to be able to report on the favourable influence the Karlovy Vary cure has on the cholesterol level.

The following report will convey some observations dealing with the effect of this cure on level of bilirubin in patients suffering from diseases of the liver.

Bilirubin is very suitable as a scale of the liver function since, as described by Straub, its secretion is a "function of the liver which can be followed very well and its observation therefore throws light on the lesion of the liver."

The fact that acute infective hepatitis has become a widespread disease in the post-war period has brought an increasing number of patients suffering from this disease to our spa. The contraindication of the Karlovy Vary drinking cure for relatively recent cases was reported many years ago by Joachim. On the other hand, however, our experience prove that chronic after-effects of infective hepatitis are very favourably affected by the Karlovy Vary cure and it can be administered the full dosage, which is also confirmed by Boecker. He observed 37 patients with intermittent hyperbilirubinemia and recorded a decrease of the bilirubin level after the drinking cure in 22 cases, i.e. in over 59 %. Nevertheless he expressed the opinion that it is impossible to achieve a permanent influence on the intermittent bilirubin increase in the serum with the drinking cure.

The demand for a permanent therapeutic effect of methods of treatment is well founded. But if we compare the effect of spa therapy (in the widest sense of the meaning) with other therapeutic procedures, such as the classical pharmacotherapy, we must also be given the right to include less pronounced and permanent effects into our balance sheet. This particularly applies to cases where a more radical assertion is not desirable for many various reasons. Arguments proving the correctness of this claim could be mentioned in great numbers. It may be sufficient to state in this paper, that we propose to take down even relatively volatile results, to reproduce them inasfar as such a reproduction is possible and to follow the further fate of cure-patients after their return on the widest basis.

Our method of evaluating the therapeutic effect on the bilirubin level — i.e. the evaluation of one single symptom of the many-sided clinical picture of post-hepatic conditions — was as follows:

Patients of one clinical sanatorium were examined in the course of one season. The serum tests were always taken in the same laboratory (and mostly by the same technical assistant). Neither the attending physician nor anybody on the staff, or the patients themselves were told why the protocols were taken from the archive in chronological order (after the patients had left). Not a single anamnesis of the diagnose groups mentioned below was eliminated as useless. The diagnosis and treatment was entrusted to three spa physicians with a long internal and balneologic practice. The examined patients belong to various age groups, both sexes, various occupations, they include inhabitants of towns and villages of several Central European nations.

The group of 63 is not the result of a special selection. No patient was under observation for a period exceeding 28 days, the initial bilirubin

values were taken immediately after the cure was commenced and most of the final test values were taken during the 4th week of treatment. The therapy was composed of the Karlovy Vary drinking cure, a carbohydrate-protein diet, thermotherapy (mostly mud and peloids) and many supplementary therapeutic procedures.

Table 1 — Groups according to diagnosis

	M	W	tot.
chron. hepatitis with fully pronounced symptoms	34	9	43
oligosymptomatic chron. hepatitis	5	2	7
slight and beginning cirrhosis of different origin	5		5
clinically advanced cirrhosis	8		8
	52	11	63

Table 2 — Duration of disease prior to spa treatment

Up to 2 years	22 patients
3—5 years	21 patients
6 years and over	20 patients

Table 3 — Age

20—25 years	5 patients
26—30 years	6 patients
31—35 years	5 patients
36—40 years	8 patients
41—45 years	9 patients
46—50 years	10 patients
over 50 years	20 patients

Over half of the patients (39) were older than 40.

As far as table 1 is concerned, it is worth mentioning that in no other types of "cure diagnoses" is there such an overwhelming number of male patients. In diseases of the bile ducts, for example, there is a pronounced majority of female patients, in dyspepsies and duodenal ulcers the findings are heterogenous.

What are the most striking causes for the majority of male patients in the above-mentioned table? First of all the fact that much more men than women are covered by health insurance, i.e. that many more men are sent for spa treatment. There was a strikingly small number of private patients among our patients. Among these private female patients the majority of diagnosed diseases are cholecystitis and cholelithiasis.

The epidemiology of hepatitis presents the only explanation concerning the increased danger of contacting hepatitis of people who work or live in communities (Siede). It may well be that this is another reason for the above-mentioned facts. It also follows from various statistics that more adult men than women develop acute infective hepatitis. It

may necessarily be taken for granted that men are generally less conscientious in observing the required long-term diet regimen during convalescence after hepatitis and frequently find it impossible to refrain from taking alcoholic drinks, that they are also more often exposed to a greater professional strain on the damaged liver than women. That is probably one of the reasons why there are more men among the patients who require a cure owing to their infective hepatitis.

It may appear that the grouping according to diagnoses in Table 1 is clinically unfounded. The reason for our action may be explained by the fact that there is no unified nomenclature of patients with liver diseases which would be observed by the doctors who recommend patients for spa treatment and this forced us to reduce the many diagnostic descriptions in order to avoid complicating the problems.

The reason why we refrained from a "functional" diagnosis in our table lies in the fact that we wanted to avoid hasty conclusions from being drawn from the bilirubin level, which, after all, is only one of the symptoms from which it would be impossible to draw conclusions concerning the possible influence on the overall complex of hepatitis by the Karlovy Vary spa therapy.

It is described elsewhere (Joachim, Boecker, Hanycz) what forms of cirrhosis of the liver are no longer indicated for spa treatment. These cases are not treated in Karlovy Vary since it would be useless from a therapeutic as well as social and medical standpoint. This may also tend to explain why our results in the remaining cases, i.e. in the cirrhosis cases indicated for spa treatment our results are relatively favourable.

In our opinion it would be possible to improve the results of spa treatment considerably if the limits of balneotherapeutic possibilities would be part of the practitioners' and specialists' general knowledge. For years we have been endeavouring to extend this knowledge by organising free exhibitions to our numerous therapeutic spas for medical students and by organising international post-graduate courses at Karlovy Vary which can look back on a 50-year old tradition. It is probably not only the current modernisation of the spas but also this educational activity which has contributed to the fact that the results with Czechoslovak patients suffering from diseases of the digestive system have brought considerable improvements to 29.45 % of these patients, prominent improvements were recorded in 63.36 % and subjective improvements in 6.6 % and these figures represent a total of 98 % of all Czechoslovak spa patients. (Statistical information of the Health Ministry of the Czechoslovak Socialist Republic No. 4/1963.) It goes without saying that we are far from drawing one-sided conclusions from this abundance. For it is well known to us that there is a great army of patients suffering from neurotic diseases of the stomach and the intestines whose disease shows not only subjective, but also roentgenologic, biochemical and even bacteriological improvements after different types of therapies. Let us just point out similar experiences made by the Hetenyi school in this connection. Principal opponents of balneotherapy tend to regard

these experiences and facts as a typical placebo effect. But things are not as simple as all that. It will probably be correct to assume that this effect is equivalent to a specific as well as unspecific effect of this therapy on the sick organism. Whether we base our explanation of this phenomenon on the central nervous system, on vegetative or humoral-pathologic reactions may be of great theoretical interest and discussable but as far as practical results are concerned it can only be of secondary importance.

The following table of achieved results only requires a short explanation.

Table 4 — Serum bilirubin before the Karlovy Vary treatment and towards its conclusion

Protocol No.	Diagnosis	Initial values	Final values
65	hep. chron.	1.35	0.89
70	hep. chron.	1.98	1.80
74	hep. chron.	1.86	1.56
77	hep. chron.	1.44	1.08
78	hep. chron.	1.25	1.10
87	hep. chron.	1.80	0.84
88	cirrhosis	4.20	2.43
90	hep. chron.	1.56	0.74
90A	hep. chron.	0.96	0.78
101	hep. chron.	1.72	0.34
107	hep. chron.	1.10	1.06
122	hep. chron.	0.84	0.72
126	hep. chron.	1.20	0.82
130	hep. chron.	1.20	0.44
133	hep. chron.	1.58	1.08
138	hep. chron.	1.20	0.96
139	hep. chron.	1.20	0.84
142	hep. chron.	1.87	0.60
143	hep. chron.	1.54	1.20
143A	hep. chron.	1.30	0.60
145	cirrhosis	0.76	0.71
148	hep. chron.	1.13	0.82
152	hep. chron.	0.84	0.80
154	cirrhosis	1.25	1.10
156	hep. chron.	1.14	0.93
159	hep. chron.	0.60	0.50
160	hep. chron.	1.15	0.82
161	hep. chron.	1.10	0.90
162	cirrhosis	4.70	0.50
163	hep. chron.	0.93	0.66
164	hep. chron.	0.93	0.66
165	hep. chron.	1.40	0.98
167	hep. chron.	0.71	0.66

Protocol No.	Diagnosis	Initial values	Final values
170	hep. chron.	1.35	1.25
176	hep. chron.	1.80	1.03
178	hep. chron.	1.50	0.66
179	hep. chron.	2.52	2.10
180	cirrhosis	2.63	1.83
237	cirrhosis	1.70	1.67
323	cirrhosis	1.35	0.98
325	hep. chron.	1.08	0.60
336	hep. chron.	2.36	1.56
337	cirrhosis	1.44	1.15
342	hep. chron.	4.01	2.58
344	hep. chron.	1.18	1.08
348	hep. chron.	1.70	0.71
349	cirrhosis	1.20	0.90
361	hep. chron.	1.60	0.76
316A	cirrhosis	1.36	0.96
397	hep. chron.	0.98	0.93
406	cirrhosis	2.44	1.67
408	cirrhosis	0.82	0.60
535	hep. chron.	1.35	0.82
537	cirrhosis	1.09	1.25
538	hep. chron.	1.40	0.76
542	hep. chron.	1.95	1.74
543	hep. chron.	1.68	0.66
547	cirrhosis	3.12	0.60
563	hep. chron.	2.63	2.21
575	hep. chron.	0.66	0.44
577	hep. chron.	1.60	0.66
588	hep. chron.	3.26	3.10
590	cirrhosis	0.76	0.40
		1.61	1.04

The difference between the initial and final values is 0.57 mg on the average. If we assume that the upper boundary of the normal bilirubin level is in the vicinity of 1.40 mg than it follows from the above-mentioned that patients who have taken the cure were below the upper boundary and it also follows from this that the average difference between initial and final values are higher than 34 % of the peak value which means that this difference is absolutely significant. Cases with doubtful results (107, 152, 237, 344, and 397) have therefore not been excluded so as to avoid any arbitrary selection which would weaken the demonstrative force of these small observations. There is no evidence in the anamneses of these patients which would suggest that the cure was not indicated for them. As far as the cas No. 537 is concerned it should be mentioned that this was a patient in whom we diagnosed a hepatogenous glycosuria. The disease was a cholangiolitic biliary cirrhosis, after the cure the patient was well compensated and had improved subjectively.

In 57 out of 63 cases the bilirubin values have dropped convincingly and this represents 90.4 per cent of all registered patients.

It should be added in conclusion that our values correspond to the "bilirubin total" and were tested by the H. van den Bergh method.

In this connection a somewhat less recent information by Arnoldi and Roubitschek is worth mentioning which describes the drop of bilirubin in the blood serum after the administration of natural Karlovy Vary Sprudel salt. Ten patients with high bilirubin levels at the Fr. Koch Clinic in Berlin who suffered from gall-bladder affection were treated with solutions of Karlovy Vary Sprudel salt and "a profound and lasting influence . . ." was recorded which "brought about normal and sub-normal values within a few days". One of the patients vomited the salt solution and his bilirubin values kept increasing. As soon as the authors administered the salt solution rectally, however, the bilirubin values duly dropped to the norm level.

The processes of the normal and the pathologic production of bilirubin and the defects of the bilirubin secretion are generally so well known that it is superfluous to go into these details. It is also permissible for our practical consideration to take no account of the extrahepatic bilirubin production since it plays a more significant role only in quite exceptional cases.

As far as the effect of the Karlovy Vary mineral water is concerned which must be credited with resulting in the normalisation of the bilirubin contents of the blood serum, we can refer to a great number of experiments with animals, to countless clinical experiences proving the cholagogue and choleretic effect of these mineral waters.

It may be assumed that the electrolytes have a favourable influence on the specific function of the liver which is applied on the hepatic circulation-gastro-intestinal tract and portal vein. The recovered balance of the liver functions which represents the most striking effect of the Karlovy Vary drinking cure was very appropriately described as the "Calm in the Gall-bladder and bile ducts" by the great physician Naunyn. This calm is particularly striking in the many thousands of patients suffering from gall-bladder troubles which we observe every year at Karlovy Vary. There is indeed a great temptation to attempt to prove a connection of the causes of hepatitis and gall-bladder diseases with the aid of the functions which the Karlovy Vary drinking cure normalises or favourably influences.

Summary

The bilirubin level of patients with chronic hepatitis and cirrhosis was compared before and after the Karlovy Vary cure. The drop in the bilirubin contents of the serum is considered a result of the drinking cure of the Karlovy Vary alkaline-saline sodium chloride thermal water (after the new nomenclature: hydrocarbonate-sulfate-therms).

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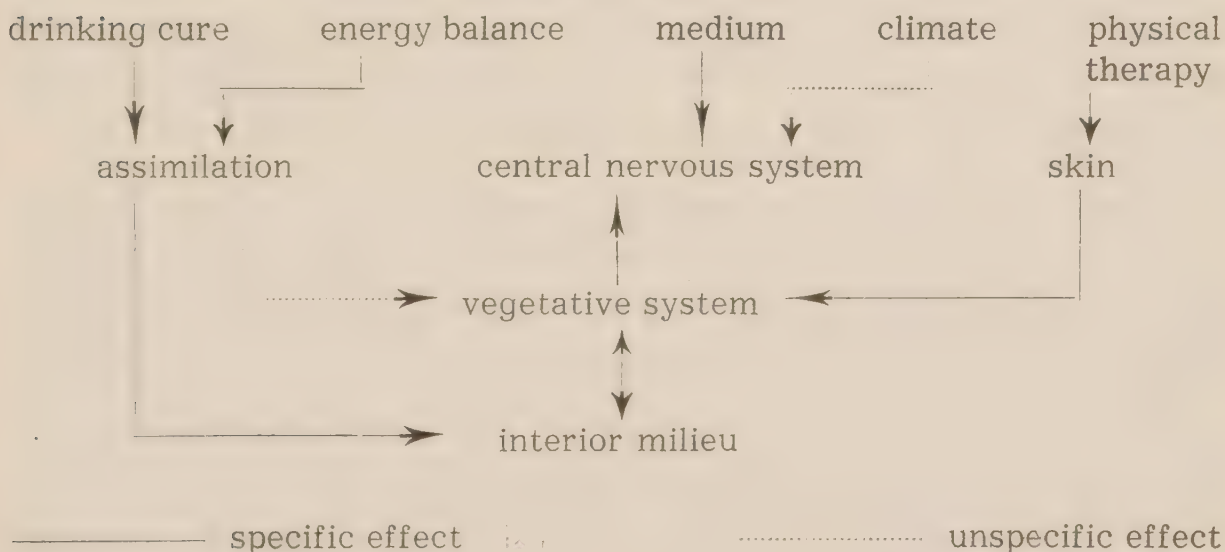
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A simple vegetative method of examination as measure of the effect of the cure of diseases of the digestive system

E. Novák, J. Michálek, M. Kodetová

The effect of the cure is generally explained as a complex effect of stimulating and calming effects of the external and internal milieu. These effects are created by the ability of the human organism to react in a specific form by forming new reflexes in the central nervous system, by changing the neurohumoral activity and finally by changes of the anatomic structure. The mechanism of the therapeutic effect of the cure can be explained on hand of the following (modified) scheme by Boecker.

Scheme 1.



Modern therapy attempts to explain the origin of diseases and the process of recovery and healing in three ways:

1. By research into the origin and the dynamics of changing reflexes (Rechtschikow),

2. By carrying out balance tests with the aid of radioisotopes (Schwiekl),

3. With the aid of investigations into the activity of the hormonal and enzymal systems (Kutschera, Klein, Fritz).

The present state of spa medicine does not yet allow a general application of these methods and in explaining the spa effect we have to apply indirect methods.

In our information we have endeavoured on hand of simple methods of investigation to follow dynamic changes in the vegetative nervous system and to prove the immediate effect of the therapy.

Our starting point was the following conception:

The biologic balance between organism and surroundings requires the co-ordinated activity of all intellectual and physical abilities (Clauser). In the everyday life of modern citizens an overburdening of the specific possibilities of the central nervous system may lead to damage of the diencephalo-cortical as well as the diencephal regulation of biologic processes (Grünner). All conscious and subconscious happenings influence the vegetative system in a higher degree than any arbitrary innervation. The vegetative nervous system fulfils the task of psychophysical relay; it is sometimes compared with areals transmitting every unpleasant happening to man, who is further elaborating this information (Kraemer).

As the phylogenetically oldest section of the nervous system, the vegetative nervous system has maintained a considerable peripheral autonomy. Together with the endocrine system it forms the vegetative system *sensu strictiori* and influences the water equilibrium in the body. Defects occurring in any section of the system necessarily have their repercussions in the functioning of the other sections.

The vegetative system makes possible an increased performance of the terminal organ, in the initial stage with the aid of the integrating function of the cerebral cortex and later autonomously (Clauser, Schultz).

It may therefore be assumed that special defects of the digestive system are due to the evident influence of the higher nervous activity (the nutriment balance of modern man is particularly regulated by the second signal system) and have their origin in an insufficiency of the central and vegetative nervous system to adaptation and integration.

Many balneologists (Amelung, Hildebrandt, Lotz, Löhr, Reichel, Wiedermann, Grüner) have tried with the aid of "vegetative problems" to make an objective approach to the therapeutic effect. In our balneologic literature we miss such critical examinations of patients suffering from digestive disturbances, where the vegetative lability as a symptom of disturbances in the central nervous system is frequently placed in the clinical forefront (attacks, inclination to spastic reactions, varying mental tension etc.).

We think that it is obvious that the functional dynamics of changes

in the vegetative nervous system during 21 or 28 days of the spa treatment cannot be evaluated with the aid of simple vegetative tests. For we hardly know the measure and the latent time in the formation of reflex stereotypes, but we assume that with a corresponding demarcation of the groups which are to be tested and the control groups at the initial stage and of the cure and after its conclusion, useful statistic replies are obtained answering the basic question whether the spa therapy has an objective and significant effect on patients' state of health.

We are carrying out our research work in co-operation with the spa Bardějovské Kúpele, where similar announcements and similar methods are employed as in our sanatoria (with Ivan Ďuriš, M.D., as collaborator) and with the sanatorium of Vyšné Ružbachy, where neuroses are treated (with Jan Tajták, M.D., as our co-operator). Different therapeutic methods are used at Vyšné Ružbachy than at Karlovy Vary. We thank both of our collaborators at these sanatoria for their co-operation and support.

Methods

In the second half of 1962 and in the first quarter of 1963 a total of 108 patients underwent medical examinations during their 21 or 28-day stay at the spa; out of this number 69 stayed in our sanatoria at Karlovy Vary, 19 at Bardějovské Kúpele and 20 at Vyšné Ružbachy. Sixty-eight patients were men and 40 women, 86 were Czech or Slovak nationality and 22 were foreigners.

There was a continuous selection of patients and clinically obvious endocrine diseases, diseases of the blood and diseases of the cardiopulmonary system, the peripheral vessels and feverish conditions were immediately excluded. The highest average body weight in the initial stage of the therapy was in the Bardějovské Kúpele group and the lowest in the Vyšné Ružbachy group which fully corresponds to the information as well as to practical experience.

As far as the syndromatic character is concerned we divided the patients into five groups: organic diseases of the stomach and duodenum, conditions following stomach resection and cholecystectomy, dyspepsia, organic diseases of the gallbladder and "other" diseases.

Almost all syndromes were present in the Karlovy Vary group, the Bardějovské Kúpele group represented ulcer disease, the Vyšné Ružbachy group with "other" diseases was given the role of control group. We have checked all patients at the beginning and the conclusion of the cure to receive information concerning their appetite, the frequency of their bowel movements, type of stool, sleep or painful sensations, since it is our experience that most patients suffering from diseases of the digestive system frequently complain about these secondary symptoms, which are probably an expression of the functional disturbance of nervous regulations.

The frequency of subjective complaints was investigated according to syndrome groups and in the individual sanatoria at the initial stage and

the end of the cure. The results were evaluated in per cents (statistic survey are not included here) and this is the conclusion :

The value of the improvement of subjective symptoms, which can also be influenced by other than pure therapeutic factors, increases if the most frequent complaints in the individual sanatoria as well as in the corresponding diagnostic groups, evidently improve. This, among other things, is conveyed by Table 1 with the reduction of mental tension, an improvement of the biologic rhythmus and creating optimal dynamic stereotypes in the central nervous system which were achieved during the patients' stay at a sanatorium. The improved appetite and sleep of patients' is due to the same effects. The improvement in patients' defecation can be explained by the improved tonus of the parasympathetic nerve supply, the livelier enzyme activity and the elimination of spasms.

We have tested the effect of the cure by checking for changes of weight, pulse and breathing frequency, the apnoea in inspiration and expiration, the systolic and diastolic pressure and its amplitude and finally the count of leukocytes, eosinophils and monocytes in the peripheral blood.

The results of the tests taken at the beginning and the end of the cure have been statistically evaluated with the aid of the T-test. (See table 2.) We have decided to take the tests mentioned below partly for technical reasons and partly for the following reasons :

Weight

is of great importance for an objective evaluation of the patients state of health. Towards the end of the cure no significant changes could be established in the total number of our patients. That is why we divided them into 3 groups according to the von Brock formula, into groups of underweight, normal and overweight. See table 1.

Table 1
Changes of weight towards the end of the cure

Group	n	x_i	y_i	\bar{u}	$p <$
normal weight	44	68.2	68.1	-0.004	not significant
underweight	30	57.6	58.6	+0.1	0.01
overweight	27	76.0	75.7	-0.61	0.05
Vyšné Ružbachy	20	60.24	62.04	+0.78	0.05

The body weight had a tendency towards normalisation in the overweight and underweight group and also increased in the Vyšné Ružbachy group, where it had been at the lowest point at the beginning of the cure.

Here we also recorded the most striking improvement in patients' appetite. The underweight patients generally showed the highest percentage of improved appetites.

Changes of the pulse rate

Patients with diseases of the digestive system generally have a labile pulse. We examined patients in a sitting positions after calming and measured the medium of two minutes. The medium values of all groups kept within the limits of the physiologic norms and were insignificant towards the end of the cure. A statistically significant increase of the frequency was recorded in the group of patients with organic diseases of the stomach or intestines, as well as the patients of Bardějovské kúpele. In both cases "p" was less than 0.02. The increase might be explained by the higher vagus tonus which is part of the ulcer disease and the normalising effect of the cure.

Changes in the breathing rate

The breathing of patients with diseases of the digestive system is superficial with a small range of movement of the thorax and diaphragm. Some patients complain of paroxysms in deep breathing with the feeling that their ability of inspiration is failing them. The causes are heterogeneous, frequently we find meteorism, abdominal pains, an increased sensibility of the abdominal wall, obesity, neurocirculatory asthenia etc. Another possible cause may be a defect in the synchronization of the respiratory muscles, an insufficient blood supply of the respiratory centre etc. We examined our patients in a sitting position after they had calmed down and tested the breathing rate during one minute.

Apnoeic periods

were measured in a sitting position after calming down and detailed instructions. The duration is measured in seconds following inspiration and after three minutes in the maximum expiration (after the patient had been instructed to exert his utmost energy). The higher values in the respiratory tests towards the end of the cure are explained as being due to the effect of training, (physical therapy, remedial gymnastics, tourism), to an improved functioning of the intestines, a reduction of the fat tissues in the abdominal cavity, an improved circulation and oxygen absorption of the tissues. All these factors have a normalising influence on the vegetative and central nervous system. The respiratory rate dropped significantly only in the age group of the fifth decade ($p < 0.02$). A prolongation of the apnoea was recorded in the inspiration as well as expiration, mostly at the statistically significant level of $p < 0.01$ to 0.05. In contrast to this observation no similar results were recorded in patients with overweight, even if they dropped weight. A statistically significant reaction was recorded in the whole group, the Karlovy Vary group as well as the group with normal weight.

Blood pressure

The examinations were made on sitting patients with a mercury manometer. We had expected the normalisation of both values and the reduction of the amplitude as an expression of an improved tonus of the blood vessels, an improved blood discharge into the arterial system, an increased minute volume as a result of the spa therapy and its effect on the integrating and adapting activity of the nervous system. The diastolic pressure dropped significantly in every case, systolic pressure in 5 out of 14, and no significant changes in the amplitude were recorded.

Leucocytes and the peripheral leucogram

After Schilling, Wiedermann, Donner and others the peripheral distribution of leucocytes is regulated by the vegetative and hormonal system. It is subject to specific and unspecific stimulations including balneotherapy. The number of leucocytes shows no significant variation towards the end of the cure. As far as the eosinophiles are concerned, however, a significant drop towards the end of the cure was recorded in the entire group, the Karlovy Vary group, as well as in the fifth age decade as can be seen from Table 2.

Discussion

The significance of a normal functioning of the vegetative system is generally recognised (Kraemer, Grüner, Lampert, Klaus, Schultz, Clauser). The numerous statements quoted in medical literature could be summarized as follows:

The parasympathetic section trophotropically influences the homoeostasis. It determines the intensity of anabolic processes. We have endeavoured to prove that this section can be influenced by the spa therapy, particularly through the skin and the digestive organs (Table 1) by acting in the sense of achieving a normalization of biologic processes. It was definitely established that an improvement of patients' appetite, bowel movement and sleep was achieved by the therapy. As for objective results the weight of underweight patients went up, and the apnoea also increased in almost all patients, with the exception of the adipose, which only proves that this change is not due to an increase of the abdominal space. Blood pressure dropped in the systole as well as the diastole without any significant changes in the amplitude. It therefore follows that a significant improvement of certain subjective complaints and definite objective symptoms was achieved. That is why we are able to declare — with certain limitations — that the complex spa therapy particularly raises the trophotropic activity of the centres of the cerebral stem. The sympathetic section of the vegetative system plays an ergotropic role and determines the intensity of catabolic processes. Our results allow us to claim that the spa therapy had a predominantly moderating effect. Certain facts, however, speak for an increase of the parasympathetic tonus, i.e. for a reduction of the sympathetic tonus: in

obese patients a significant weight reduction was recorded. In all patients a significant reduction of eosinophiles was achieved, which is explained by an increased activity of the adrenal glands, which are stimulated by the sympathicus. In the entire Bardějovské Kúpele group and in the group of patients with organic stomach diseases a significant pulse acceleration was recorded.

The spa therapy and its influence on the cerebral cortex : this determines among other things the rate and amplitude of biologic rhythms. Correctly elaborated spa prescriptions should bring to bear a positive influence on these rhythms by promoting activity and rest, energy intake and expenditure (K o c á b). We assume that our results confirm these aspects.

Where the effort to establish these facts brought the poorest results was in the case of the Bardějovské Kúpele group and the control group. This it is also confirmed by the experience gained with ulcer patients who are sent for spa treatment. These patients mostly come to the spa only after complications or beginning compensational defects have already set in. The effect of the cure is most insecure in conditions of this kind.

The patients from Vyšné Ružbachy are the control group in our observations. Only one of the objective symptoms showed a significant reaction as far as these were concerned, but the increase of the body weight is remarkable, however, and the highest percentage in the improvement of subjective complaints was also recorded here. This confirms the general experience concerning the remarkable effect in the spa treatment of neuroses. The Karlovy Vary group with its heterogeneous symptomatology showed the highest percentage of objective improvement.

Results

We raised the question whether the spa therapy represents and can represent an objective influence on the state of patients' health and whether it is a special therapeutic method. Statistic results taken at the beginning and towards the end of the cure provide the best answer to this question.

In order to evaluate our results correctly it is necessary to take into account not only objective data but also subjective feelings. A necessary supplement will have to be composed of observations made in healthy persons and in patients who are treated with non-spa therapies.

Summary

Based on the assumption that a spa therapy acts via the central and vegetative nervous system, the effect of the cure is examined in patients with diseases of the digestive system. Simple "vegetative tests" are taken before the therapy is commenced and towards the end of the cure. The positive effect of the cure is in full harmony with the favourable influence of the treatment on subjective complaints.

Table 2

Objective changes at the end of the cure

Group	n	Apnoea in insp. incr.	Apnoea in exp. incr.	Syst. pressure reduced	Diast. pressure reduced
Total number	108	0.01	0.01	0.01	0.01
Karlovy Vary	69	0.05	0.01	0.01	0.01
Vyšné Ružbachy	20	0.02	0.01	—	—
Bardějovské Kúpele	19	—	—	—	0.05
31—40 years	46	—	0.01	0.01	0.01
41—50 years	32	0.02	—	—	0.01
Underweight	30	—	0.02	—	0.01
Normalweight	44	—	0.02	0.05	0.05
Overweight	27	—	—	0.02	0.01
Org. stom. and intest. dis.	29	—	0.05	—	0.01
Post-operat. cond.	25	—	—	—	0.05
Function. dysp.	16	0.02	0.02	—	—
Org. disease of gallbladder	12	—	—	—	0.05
Other dis.	26	0.01	—	—	0.02

Table 2

as far as statistically significant

Eosinophile red.	Pulse rate increas.	Body weight increas.	Other
0.01	—	—	—
0.05	—	—	—
—	—	0.05	pulse increased p - 0.02
—	0.02	—	—
—	—	—	—
0.02	—	—	reduced breathing p - 0.02
—	—	0.01	—
—	—	—	—
—	—	reduced 0.05	pressure amplitude smaller 0.0
—	0.02	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	monocytes reduced p - 0.01

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The effect of balneological treatment on improving the general state of health and the stability to work of employees of the engineering industry suffering from gastroduodenal ulcer

Funda Pavel, M.D.

As far as the number of missed working days are concerned diseases of the gastrointestinal tract represent the most serious nosologic group of internal diseases and their share is 10.2 per cent in men and 8.6 per cent in women as can be seen from the statistical data of missed working days owing to sickness for the year 1959.

Although a certain downward trend in sickness is apparent during recent years in this nosological group as a whole there are still remarkable fluctuations in the individual diagnostic groups. While decreases are recorded in the ulcerous disease and cholecystitis an upward trend in the inability to work owing to biliary calculi is apparent.

It is, however, more significant to follow certain age groups where the centre of gravity in the incapacity to work owing to diseases of this category affects particularly groups of the most productive age, which is of outstanding importance from the point of view of the national economy. The most frequent occurrence of diseases of the digestive system in men is in the age between 20—29 in men and 30—39 in women.

In the ulcerous disease the top occurrence of work disability in men is in the age between 30—39 and between 50—59 years and in women between 40—49 years. In contrast to this we find the bulk occurrence of the so-called catarrh of the stomach and intestines in men as well as women in the 3rd decennium.

It is also interesting to note that the incidence of the gastroduodenal ulcer varies considerably with the individual categories of employment. That is why the investigation according to industrial Trade Unions revealed the following picture: TU of workers of the Mining Industry — 1338, Consumer Goods Industry — 1309, Metallurgy and Ore Mining — 1277 and the Building Industry 1253. The lowest figures are from the union of non-productive workers with the exception of the health services. The greatest incidence in women is in the health services, the

mining industry and municipal production with the lowest figures in non-productive branches.

In analysing the groups of gastrointestinal diseases we can observe another two subgroups. One subgroup is represented by the so-called catarrhs which is significant as far as the number of patients is concerned but generally it only results in short-term disability to work and there are no periodical relapses. The most important in the second subgroup is the ulcerous disease of stomach and duodenum where disability to work is markedly longer, which involves frequent hospitalisation or other treatment in health institutes. There is a sharp inclination to repeated manifestations and two relapses within one year no exception with the prognosis of long-term chronicity and, as a result, with repeated work disabilities.

This subgroup of diseases, which particularly in the key industries, has an exceptionally high incidence, was the subject of investigation in a large engineering enterprise with the aim of establishing the extent to which the occurring relapses and other expressions of the ulcerous disease can be influenced by the Karlovy Vary balneological treatment, or by any other spa treatment; this investigation also endeavoured to establish whether this comprehensive treatment aimed in the first place at prevention can also influence the manifestation of the disease and consequently the disability to work conditioned by this diagnosis.

The approach to this problem clearly indicated that the answer to the above mentioned theme will not be absolutely precise, since it is impossible to discern all factors involved in the development of the stage of manifestation of the diseases. The method which the authors were obliged to apply, including the form of evaluating and checking case data, and comments included in the history of the disease, as well as reports concerning missed work days owing to sickness, the talks with involved patients and their examination — all this is liable to be the subject of criticism as scientifically insufficient. The authors are fully aware of these shortcomings and in an effort to create preconditions for a continual long-term observation of patients of this category, directly in factory health centres and throughout the course of balneological treatment they believe that this might establish the framework for investigating the given problem and provide certain information for a further detailed study.

The authors are especially indebted to the heads of the factory polyclinic at the ČKD Stalingrad Works in Prague — to the head surgeon Mr. Bílý, M.D. — and to the helpful co-operation of the physicians of the 1st, 2nd, 3rd, 6th and 8th factory health centre where 65 employees were examined with diagnosed gastroduodenal ulcer 60 of whom were men and 5 women.

The investigation followed the form of each patients employment and the duties his or her job involved. It was established whether patients are employed in day shifts only or whether their employment also involves work at night, whether it is light or heavy manual labour, or work in the administration of the factory involving sudden overtime hours. Data were collected regarding the expressions of the disease (pains after certain food, at night, as well as the periodic character of the pain, pyrosis, vomiting or nausea, defecation or melena), loss of weight or weight increase, it was investigated whether patients have a chance to observe their diet, whether parents, brothers or sisters suffer from the disease, the decennium when the first symptoms occurred, the duration of the disease exceeding 5, 10, 15 years and longer. Patients were investigated for drinking and smoking habits, whether it was necessary to change employment owing to the disease in the course of its duration, the quality of patients' sleep was investigated, hours of sleep with or without hypnotics were recorded. A detailed investigation of the treatment of the disease was made aimed at determining whether it was rather a symptomatic type of treatment in periods of distress, or a systematic long-term treatment, hospitalisation or home treatment, night-sanatorium treatment, balneological treatment in Karlovy Vary or in other spas, and it was also recorded whether the patient underwent spa treatment in Karlovy Vary within the last 18 months. In determining the question of work disability it was investigated whether the patient was disabled owing to the ulcerous disease of the stomach and duodenum within the past 12 months prior to balneological treatment and within the 12 months following spa treatment owing to the same disease. Other items included surgery of the ulcer and balneological treatment within the 12 months after surgical treatment, digestive complaints, if any, dumping syndrome, milk and sweet-tolerance were recorded, body weight variations and a total subjective evaluation of the patients' state of health were also included.

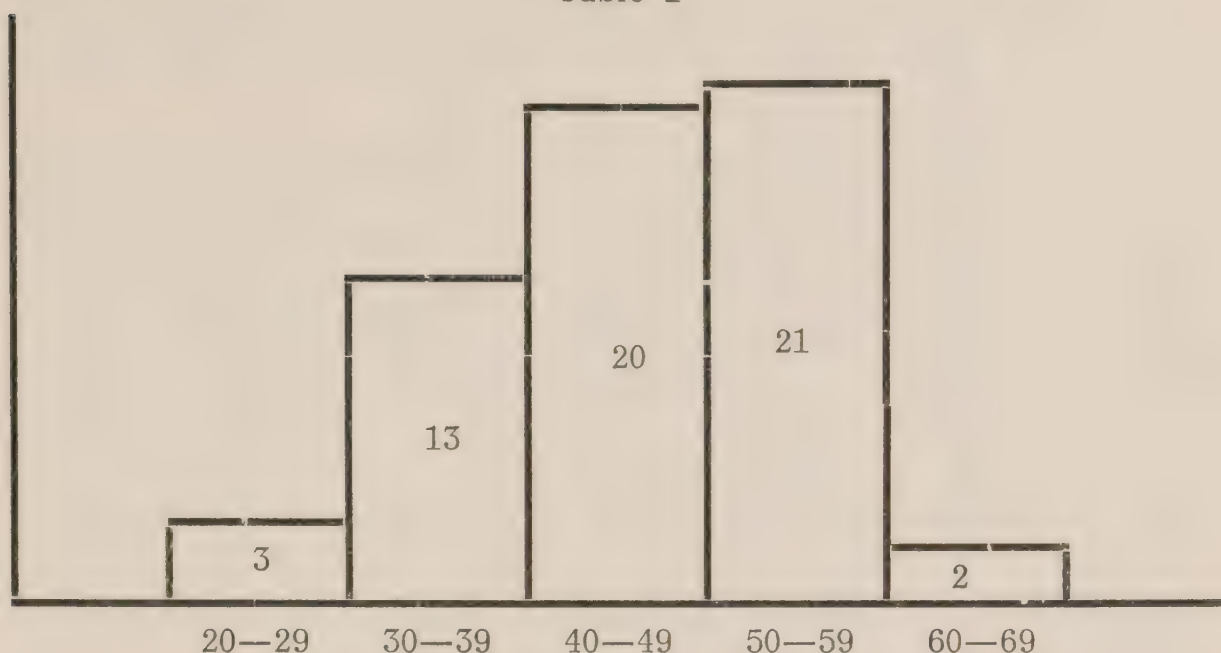
From the total of patients 1 male patient had to be excluded where a tumorous disease of extragastric localisation was corroborated and 1 women patient where no pathognomonic evidence could be established for ulceration and whose symptoms were rather of a cholecystopathic nature.

That is why only a group of 59 men and 4 women remained for evaluation. This disproportion is in no relation to the incidence frequency of this disease, but it corresponds to the composition of employees since the number of women represents only a small percentage. For this small number of women it was necessary to refrain from evaluating the above-mentioned factors in the ulcerous disease of women patients and investigate them only in the group of male patients.

Of the above-mentioned number of 59 patients the average age was 46.4 with the youngest patient a 26-year-old and the oldest 60 years old. The frequency of the disease in individual age groups is indicated in table 1.

Frequency of ulcerous disease according to age-groups

Table 1



From this survey according to patients' average age it is apparent that the highest frequency is in the 4th—6th decennial. The evaluation of the last group is beyond our means since the number of patients who are still employed in our factories at that age is insignificant.

According to the character of employment 19 patients i.e. 32 per cent performed heavy manual labour and 3 of them also worked on night shifts, another 2 patients were transferred to day shifts only after ulceration was diagnosed in them. The group of patients performing light manual work consisted of 20 patients i.e. 34 per cent; nobody in this group was employed on night shifts and only one patient was transferred to day shifts after the ulcer was diagnosed. The third group consisting of workers of the factory administration numbering 20 (i.e. 34 per cent) had only 7 patients who had to perform over-time work, which mostly was required at the end of the month and in one case it meant that an employee had to work 15 hours without interruption. In one case where a patient was transferred from production into the factory administration owing to the disease he also reported that he had to work on night shift before his transfer to the administration. The anamnestic statements were very varied and generally confirmed one of the defects contained in the inquiry.

As far as changes in patients' body weight are concerned different signs of weight drops were recorded in 22 (i.e. 37.5 per cent) patients, in 8 (i.e. 13.15 per cent) patients a wage increase was recorded and the remaining patients (i.e. 49 per cent) reported insignificant fluctuations not exceeding 1 kg or no changes whatever.

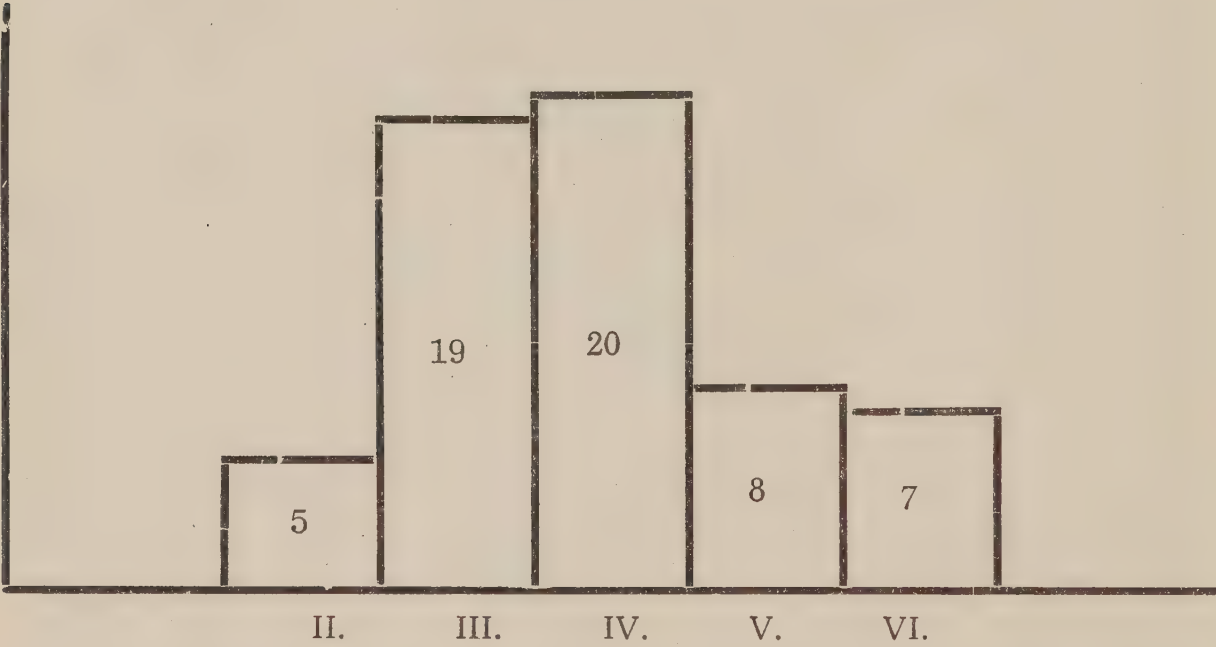
In recording the diet therapy the investigators encountered many var-

ied opinions concerning the principles of keeping a diet and the conception of diet therapy. The average patient admitted that in periods of comfort they observe a very liberal diet with the exclusion of certain non-tolerated foods, 8 patients stated that they do not even observe these limitations and eat anything they feel like.

As far as family case history is concerned 13 patients (i.e. 22 per cent) stated that one of their parents suffered from ulcerous disease, in 5 cases (i.e. 8.4 per cent) stomach cancer was recorded, 10 (i.e. 17 per cent) patients stated that their brothers or sisters suffered from ulcerations, in 2 cases 2 brothers or sisters had ulcerations of the gastrointestinal tract and in 5 of them stomach resection had been performed. It is interesting to note that one woman patient who herself underwent stomach surgery as a patient with a duodenal ulcer stated that in her family 2 brothers were operated since they had stomach cancer (one of them died) and one sister who had a duodenal ulcer was also operated.

The beginning of manifestations of the ulcerous disease is indicated in Table 2.

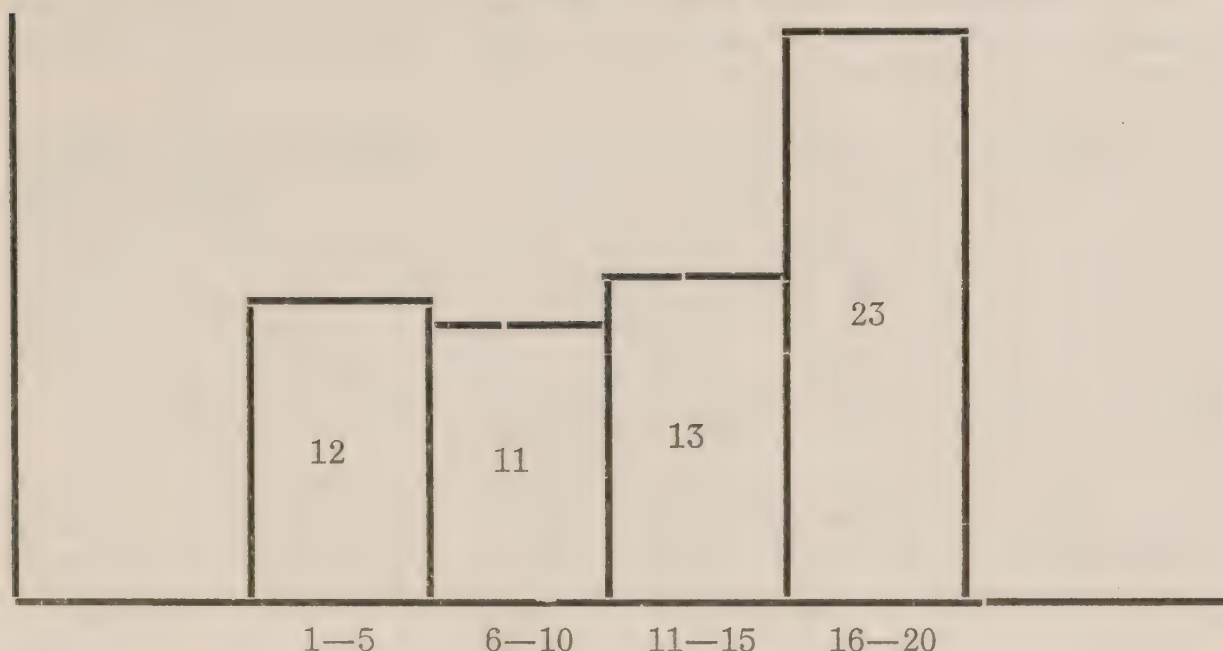
Table 2



It is also interesting to note, that the highest frequency of earliest stage is in the 3rd and 4th decennium, representing a total of 66 per cent of all recorded initial stages.

Following up the duration of the disease may lead to certain distortions concerning the registration of the younger age groups of patients, where the duration of the disease is naturally influenced by the patients' age. That is why this group should be taken with reserve and included into the potentially chronic patients' group from the practical long-range point of view. A survey of this group is provided by table 3.

Table 3



The question of nicotine and alcohol in connection with ulceration has been discussed many times. In the investigated group of patients there were about 40 per cent of nonsmokers and 60 per cent of smokers who stated that they smoke between 3 and 50 cigarettes a day. There were about 25 per cent of teetotallers and the others stated that they drink beer or wine now and then, none of them admitted drinking hard drinks.

The ulcer forced 19 patients (i.e. 32 per cent) to change the character of their employment or to adapt it, in 3 cases this happened after the ulcer was operated, in other cases afternoon shifts were omitted and one of the patients stated that the change in the character of his employment is less favourable for him than the original arrangement.

Our investigation also dealt with the hours of sleep, which was 7—8 hours per day in the majority of questioned patients, some of whom take hypnotics. Twelve patients sleep only 5—6 hours and 2 only 3—4 hours. These two patients suffered from ulcerous diseases of late occurrence and long duration with pronounced family anamnesis, where parents, brothers and sisters also suffer from ulcers and where a pronounced lability of the vegetative system was diagnosed.

Another set of questions dealt with the therapeutic problem. According to the scheme mentioned above the investigation followed the symptomatic treatment as well as various forms of systematic therapy.

It is gratifying that only in 2 patients of this group was the treatment symptomatic, in one of the patients a resection was performed shortly afterwards and the patient is without subjective complaints since then. In the second case the patient is a 56-year-old male where the disease is quite recent, coincides with its occurrence in the patients' brothers who are without greater subjective complaints with the ulcer localised at the duodenum. All the remaining patients are treated systematically

as out-patients, in hospitals or night sanatoria which are at the disposal of the factory or they are treated balneologically.

Out of the investigated 59 patients 20 (i.e. 34 per cent) underwent spa treatment once or several times, 19 of them were treated in Karlovy Vary, 1 in the Bardějov Spas.

It is apparent that the great majority of the patients who were treated balneologically were old-timers suffering from the ulcerous disease. They had repeatedly been treated as out-patients, hospitals and night sanatoria so that balneation was only a supplement in the rich pattern of therapeutic mosaic. The high number of resections — 9 (i.e. 45 per cent), also indicates the resistance to current methods of internal medicine and it is most probable that the following changes and the repeated replases of the disease finally made surgery inevitable.

In the entire group of patients there is nobody who suffers from this disease for less than five years and it was also impossible to find patients with very light forms of the disease where current treatment was successful and was therefore not followed up by balneological therapy.

Of the group of patients after resection 3 state that the complaints continue. In one of them the resection was carried out 26 years back and since that time he was hospitalised repeatedly since 1938 for continued difficulties. In this case it was highly improbable that balneological treatment could succeed in eliminating his long-lasting difficulties. The second patient who had a resection 12 years ago, states that he suffers small incomfort particularly in the early spring period, but a long period must have passed from his treatment at a spa since he did not state the year of his last balneological treatment. The last of this group states that the complaints continue since the operations which were not particularly influenced by the balneological treatment but after spa treatment he did not miss any working time for reasons of disablement.

The other patients who had resection stated a marked improvement after the treatment and when they were examined they were without digestive difficulties. None of these patients missed work as a result of the original disease and in 2 patients disablement to work prior to spa treatment was not repeated in the course of the 12 months following balneological treatment since it resulted in a great improvement of the patients' state of health.

In the group of patients with ulcerous disease who had no resection — altogether 11 cases — it proved impossible to determine the effect of the treatment in one patient whose approach to the therapy of his disease was absolutely negative and particularly to balneological treatment. The second patient who stated that he just had been treated by injections as an out-patient and who had two years previously been treated at a spa for manifestations of ulceration stated that he has been without complaints for the past two years. In all the remaining 9 patients no disability to work for repeated manifestations of the ulcerous disease was recorded. Only one patient stated that he did not observe

any change in his state of health after spa treatment but the complaints of this patient were of a different nature.

In order to be able to evaluate the total effect of balneological treatment it would seem necessary to confront it with a group of patients of a corresponding state of health who did not have any spa treatment. The set of patients studied in the above-mentioned information does not provide such a homogenous group. It is nevertheless apparent, however, that balneological treatment with its complex effects had a favourable influence on the general state of health of patients suffering from this disease for a long time and that these patients made repeated use of spa treatment whenever they had a chance to do so. Admitting that the reasons for this need not always have been health reasons we can claim from our own experience that nowadays, when spa treatment is in most cases administered during employees' legal holiday period it is enjoying an ever increasing popularity for its striking effect in the conservative therapy of the ulcerous disease of the stomach and duodenum and its more concrete evaluation will be possible under the above-mentioned scheme of long-term observation of patients with similar health criteria.

The Karlovy Vary Cure as a prophylaxis of arteriosclerosis in diabetic patients

J. Benda, M.D., and J. Bendová

The number of patients with cardiovascular system diseases is continually increasing on a world scale although rheumatic heart diseases, which represented the majority of these cases not so long ago are now decreasing. The reason for the more frequent incidence of cardiac diseases lies in the increased number of vascular diseases. This particularly applies to coronary sclerosis of the younger age groups. The age limit of this disease shows a continually decreasing tendency and patients with vascular diseases who are below the age of forty are not uncommon nowadays.

Many physicians explain the cause with the continual haste of modern life and its stresses and changes. But even if an overburdening of the central nervous system caused by excitements may play an unfavourable role and affect the course of the disease, it is nevertheless hardly proved by any facts that frequent nervous conditions lead directly to vascular diseases. For it must be remembered that excitements have existed throughout history in epidemics, conflagrations, famines and wars and last but not least it is worth while mentioning the everyday struggle for survival.

The widespread occurrence of cardiovascular diseases must have its causes in the increase of such kinds of diseases which must be regarded as primary. It therefore follows that if we want to combat arteriosclerosis successfully we have to devote our attention to the prophylaxis of these primary diseases.

It is sufficiently known that one of the primary causes of arteriosclerosis is the hypertensive disease.

It is also necessary to devote our special attention to two further diseases causing early arteriosclerosis which must be combatted with greater determination than hitherto: obesity and diabetes. Degenerations of the vascular walls are uncomparably more frequent in diabetics than in non-diabetics. It has already been established by Noorden that the vessels of diabetics are comparable to vessels of non-diabetics who are about ten years elder. Syllaba underlined the greater incidence

of myocardial infarction and coronary sclerosis in diabetics. H e t é n y i reports that the cause of death in about 50 per cent of diabetics are vascular diseases and cardiac infarction. J o s l i n and L a b b é think that this is due to a longlasting hyperglycaemia and other authors regard blood sugar variations as the responsible factor. The fluctuation of the blood sugar releases ACTH, respectively glycocortycoids thus damaging the vascular walls. In recent years it is particularly believed to be the result of a disturbed lipid metabolism (A n i t s c h k o w, W o l k o w a).

The incidence and extension of vascular lesions in diabetics are not dependent on the age of the patients. They rather tend to depend on the duration of the disease and the type of treatment.

J o s l i n expressed the view that an energetic treatment may protect diabetics from vascular complications. Spa treatment is a very valuable supplement of the diabetes therapy.

The value of the Karlovy Vary cure was proved in numerous publications of an experimental, psychological and statistical character. The authors who pointed out these facts were mostly French and Czech. S y l l a b a (1) was the first who summarized the effect of the Karlovy Vary cure in 1938 and enumerated the reasons for this effect. H a v r a n e k (2) reporting at the Gastroenterologic Congress in Karlovy Vary in 1949 informed it of his experimental observations of diabetics who were treated with saline-muriatic thermal springs of Karlovy Vary. H e j d a (3) in 1952 and J o a c h i m (4) in 1954 both dealt with the character and the effect of the cure in Karlovy Vary. All these reports which concentrated on the carbohydrate metabolism inform of an increased tolerance, a reduced glycaemia before breakfast (S t r a n s k y, K e r n) and a slight alkalisation. S y l l a b a and Č e r m á k (5) studied the effect of the spa therapy on the concentration of aceton bodies in the serum and urine.

The disturbance of the carbohydrate metabolism in the diabetic, particularly in medium age is usually accompanied by a disturbance in the protein and fat metabolism. According to D o l e (6) there are three processes affected in the fat metabolism: A defect in the synthesis of fat acid, an increased mobilisation of fats in the adipose tissues and abnormal fat deposits in various tissues. This third process can be observed in obesity arteriosclerosis, fatty liver and similar variatons which are not specific for diabetes, it is true, but are diagnosed so frequently with it that we have the right to include them in the etiology.

Diabetes in middle age is mostly found in the overnourished. An additional complication in diabetics is an early arteriosclerosis. In the case history of diabetics as well as obese patients we find a common and incorrect nutrition. That is why we have concentrated our attention on defects of the fat metabolism in all cases where nutrition defects were established in the case history.

Fluctuations in the lipid level of the serum could be proved with the aid of intermediate metabolism tests by isotopes, but our examinations provided us with a very good indications as far as the metabolic processes are concerned, even through we realize full well that many factors must

be included (8). Following up the individual lipid fractions (9), we gain an insight into the dynamics of the changes and equipped with this knowledge we can apply it to the prognosis and therapy of the fat metabolism.

We have raised two fundamental questions:

1. Are there fundamental differences in the level of serum lipids and their various fractions in patients with nutritional defects?
2. Can these defects be influenced by the complex Karlovy Vary cure?

Our material and the method

We have examined healthy collaborators in whose family anamnesis there is not one single case of diabetes, hypertension, coronary sclerosis or obesity. In their own case history there were no diseases of the liver, gallbladder diseases, diseases of the thyroid gland or kidneys (10). We further examined a group of obese patients whose main disease was dyspepsia (stomach, biliary, enterogenous) and who had no signs of organic diseases of the digestive organs nor arteriosclerosis. We also examined a group of diabetics (58 people) without any special selection. Only diabetics with liver and kidney diseases were excluded. The diabetics were divided into a group with symptoms of arteriosclerosis and one without these symptoms. There was no case of consumptive diabetes among them. These patients had been treated by diet, by oral anti-diabetics or insulin. The criterion for cardiovascular diseases of arteriosclerotic diabetics was a case history of heart infarctation, coronary sclerosis, vascular lesion of the central nervous system, electrocardiographic signs of coronary insufficiency, roentgenologic changes on the aorta, circulatory defects of the extremities and changes in the fundus. The last group comprised 14 patients after stomach resection.

Blood sugar was tested on the first day before breakfast and control tests were taken on the 25th day of the cure. In order to exclude a lesion of the liver, the liver function was tested in all patients and a protein electrophoresis was carried out. The examinations took place in winter (November 1958 — February 1959).

The lipid level in the serum was tested according to the method developed by Kunkel, Ahrens and Eisenmenger and the norm value was 400—800 mg%. The cholesterol total was tested by the Liebermann—Burchardt method. The phospholipids were established with lipid phosphor by reducing it with hydrochinon and sodium hydrogen sulphite. The serum was distributed electrophoretically on a 9 cm wide tape of Whatman paper No. 1. Veronal-oxalate-citrate pH 8.5 μ -0.1 was used as buffer with 300 V during 6 hours. Paper strips, 0.5 cm wide, were cut from the middle and edge of the colored protein fractions. One was coloured with Sudan III solution and then the lipo-protein fraction was measured photometrically, after the colour had been leached with acid alcohol. The alpha and beta fraction was eliminated from the other strips with alcohol-ether and the extracts were measured for cholesterol and phospholipids as above. The cholesterol ester and the free cholesterol

was also tested by the Liebermann—Burchardt method after a previous adsorption with aluminium dioxide. The esters were eliminated by tetrachlormethane and the free cholesterol with chloroform.

The treatment

According to principle only the Karlovy Vary drinking cure and diet were used in the treatment. The diabetic patients were given diet No. 9 (after Doberský) with 200—250 g of carbohydrates and diabetics who were not on insulin had one fruit-diet day each week. Adipose patients were put on a diet containing about 2,300 calories and the dyspeptic complaints of the patients were taken into consideration. These patients, too, had one fruit-day each week. Patients who were up to six months after a stomach resection were put on a modified diet No. 2 (Doberský), the remainder of the patients after stomach resections on diet No. 2 plus butter, cream cheese and eggs. The healthy control persons took their meals in the sanatorium work's canteen and did not drink any mineral water. The patients took the waters three times daily at the spring and this was connected with long walks. Diabetic patients were prescribed mineral waters from the Mill-spring and adipose patients other mineral waters according to their basic disease. In addition to the drinking cure diabetics were taking carbon-dioxide mineral water baths with radon, hydrotherapy, swedish, under-water massage, and adipose diabetics also had enemas and enterocleaner. All participants took remedial exercises in groups. The patients after stomach resection, in contrast to the above-mentioned groups had a rest-regimen with rest after meals, they were prescribed oxygen or carbon dioxide baths only every second day.

Results before the therapy

The evaluation of the tests taken before the therapy was commenced reveals, that there were typical values for the individual groups. Of a significant nature are the higher lipemia values in the group of the overnourished, whereas there were no variations in the group after stomach surgery. Only in the diabetic patients there was a considerably higher level of beta-lipoproteins.

The cholesterol values corresponded with the total lipemia. The highest values were recorded in diabetic patients with arterosclerosis. They were considerably higher than those of diabetics without arterosclerosis or adipose patients. These two groups can again be distinguished quite distinctly from the patients after stomach surgery and the control group of healthy people. The distribution of the cholesterol fractions is again typical: in the alpha fractions there are no differences of a significant nature, in the beta-fraction there is a markedly increased cholesterol in the mg% of diabetics with arterosclerosis and similar values were recorded in adipose patients. As for beta-lipoprotein-cholesterol, the relations were as follows: in healthy people and patients after stomach

resections 64.9 per cent and 66.8 per cent, in diabetics with arteriosclerosis it was 74.2 per cent.

The level of cholesterol ester and of free cholesterol were in proper relation to the corresponding total cholesterol values. The permanent relation of these values confirms the stability of the quotient ester (total cholesterol).

Variations in the phospholipid counts compared with the healthy test persons were only recorded in the group of patients after stomach surgery (significantly low values) and there the distribution of the phospholipids in the beta-fraction is again only different in the group after stomach surgery.

Results of the cure

After the cure the lipids showed a tendency to normalisation, i.e. they came closer to the values counted in the healthy test persons. After 25 days the values recorded in healthy test persons were so insignificantly fluctuating that we do not even mention them.

During the therapy the majority of patients was improved (Table No. 1): the subjective complaints disappeared in diabetic patients, who no longer complained of feeling thirst, dryness in the mouth, and weakness, but also an objective improvement of the blood-sugar and urine-sugar tests before breakfast was recorded with a frequent loss of glycosuria, a reduction of the diuresis and of body weight as well as an increase in the carbo-hydrate tolerance. In adipose patients the dyspeptic symptoms began to disappear and the body weight was reduced by an average 2.8 kg, the maximum weight reduction was 6.3 kg and the minimum 0.60 kg. The disappearance of complaints in the group of patients after stomach surgery went hand in hand with their increase of body weight (up to 2 kg).

Diabetics without arteriosclerosis also showed great improvements with a significant drop of lipemia, while the beta-lipoproteins remained unchanged. A significant drop was also recorded in the total cholesterol as well as the cholesterol of the beta-fraction. Like Tichý and Ledvina (10) we also found a drop in the final value and this was particularly the case in adipose patients where the drop was larger than the medium initial value. The quotient ester (total cholesterol) did not change. The decrease of the phospholipid values brought them within the limit of significance and there was a marked reduction of phospholipides in the beta-fraction.

In diabetic patients with arteriosclerosis there was merely a drop in the total lipemia. The drop in the total cholesterol values is not significant, and this also applies to the changes in the individual fractions. In the beta-lipoproteins there was even a slight increase (1.05 %). The ester cholesterol quotient remained unchanged and the phospholipids also remained without changes.

The results of the cure in adipose patients are similar to those of the diabetic patients without arteriosclerosis, but they are more pronounced.

Particularly striking is the drop in the total lipemia and in the total cholesterol values, as well as its beta-fraction. A marked reduction in the free cholesterol could only be established in this group. The quotient is small, which means that the ester in the serum have relatively increased. There was no change in the phospholipids.

In the group of patients after stomach surgery we find insignificant increases of the lipemia and cholesterol. On the whole the fraction remained unchanged. Although the free cholesterol only showed a slight increase, the quotient still changed significantly. Only in this group was it possible to record a considerable increase of the total phospholipids, particularly the alpha fraction.

Discussion

Vascular complications stand in the foreground of the diabetes therapy. That is why many authors turn their attention on the examination of the fat metabolism in diabetes. The dynamics of the variations of the serum lipids provides us with a possibility of exploiting them in the prognosis. P o m e r a n z e and K u n k e l (12) observed arteriosclerosis in 78 per cent of all diabetics (as well as hyperlipemia) and found that the occurrence of hypercholesterolemia is more frequent in diabetics with arteriosclerosis than in diabetics without arteriosclerosis. These findings are supplemented by the detailed study by I n t r o z z i, B e r n a s c o n i and B u s c a r i n i (13) dealing with the significant variations taking place in the fractions and glycoproteins.

We have established characteristic changes in our groups: this concerns cholesterol in group of the overnourished, in the serum of diabetics with arteriosclerosis. As regards phospholipides our results correspond with the findings of S u r e (14) and G o l d b l o o m e (15) and prove defects in the nourishment of patients after stomach surgery. The Karlovy Vary treatment has a normalising effect on the spectrum of diabetics without arteriosclerosis, particularly of adipose patients. In diabetics with arteriosclerosis there is an almost total lack of changes. Our successes with non-sclerotic diabetics are much more significant than the successes recorded by I n t r o z z i and others (16) after a 3-month therapy with oral preparations.

Decisive importance for the results of the cure must be attributed to the low-calory and low-fat diet, an increased calory expenditure during the cure due to plentiful walking and remedial physical exercises and in particular to the effect of the Karlovy Vary drinking cure. This stimulates choleresis, contributes to an increased excretion of cholesterol, speeds up the bowel activity and reduces intestinal resorption of cholesterol. According to Stránský and Kern it results in a lower liver steatosis, renews the glycogen reserves of the liver cell and regulates the metabolism of the carbohydrates. Fats are better exploited as sources of energy and the clinical effect is the disappearance of weakness and increased performance. A rational diet and way of life under the influence of the Karlovy Vary cure on the central nervous system in the case of patients

after stomach resection are of great value in conditioning the metabolic balance and are particularly favourable for the sphere of phospholipids.

Summary

In diabetics, adipose patients and cases after stomach resection characteristic changes were discovered in the fat metabolism, which expressed themselves in the level of the serum lipids and their distribution in the fractions.

The Karlovy Vary cure has a normalising effect on these changes. The most significant normalisation was established in adipose patients with gastric, biliary or enterogenic dyspepsia. A fundamental improvement of the basic disease was recorded in all the patients at the same time. There is reason to assume that the complex Karlovy Vary cure contributes in the prevention of premature arteriosclerosis, particularly in patients who are threatened by vascular complications, i.e. in adult diabetics and adipose patients. The serological variations of arteriosclerotic diabetics resist the effect of the spa treatment owing to the persistency of the disease.

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The Effectiveness of the Karlovy Vary Cure

Jan Hanycz, M.D.

I.

Reports about the results of spa treatment are usually based on subjective testimony of the patients, on various questionnaires and only rarely on check-ups after completion of the cure or in the course of subesquent treatment.

The broad subjective differences in the description of complaints by the various patients (for example dyspeptic pains or pains suffered in a gall-bladder attack) have a bearing on the result of statistical studies. On the basis of statistics of this sort we are competent only to speak of an improvement of the subjective complaints of the patient.

The organisation of our spa system however, enables us to prove objectively that balneotherapy generally rates among the most effective methods of treatment.

It is not the purpose of this report to analyze the various aspects that make for this effect. We know that they include various factors, from the drinking cure, the diet, and the atmosphere of the spa to the cultural and climatic influence. I consider a useful criterion for evaluating the effect of the Karlovy Vary cure, among other things, the number of cases in which, thanks to the cure, the patients' ability to work and lead a normal life was restored.

For several years official statistics has been dealing with the number of spa guests who began the cure with work disabilities and immediately after the cure were again able to work in their various professions. The figures in this statistics of course are only of relative value because the spa physician is not obligated to mark down whether the patient is capable of working after the completion of the cure. If, however, he describes a patient as completely cured he often does it because he has either found a marked difference between the complaint and the objective findings and its description in the application for spa treatment.

If we wish to get a picture of the improvement of the working ability after spa treatment, we must ask the spa physician to enter in his case history whether the patient:

- a) continues to be unable to work,
- b) becomes able to work,
- c) if so, how long after completion of the cure.

He must also state whether he recommends a change in vocation or profession, changed or reduced working hours, special rest periods, and so forth. The present practice of leaving the decision to the family doctor or a medical commission does not seem expedient to me because observation of a patient over a period of from three to four weeks and laboratory and medical examinations, that have become a matter of course in every spa, make it possible for the spa physician to express himself precisely and accurately. If these considerations are to be valuable for us, the spa physician has to meet certain requirements. The first one is a well-founded theoretic knowledge of the field, next many years of experience in internal medicine, in the case of Karlovy Vary in gastroenterology, a fundamental knowledge of balneology, especially in expert attestation. It is surprising how little the basis of attestation is known among those who do not specialise in the field.

This is due to several things.

Most of our spa physicians are in an age group who studied at a time when expert attestation was not in the curriculum. Balneology was also considerably isolated here until recently, a condition that was eliminated only by the new system of post-graduate medical studies. Secondly, many of the spa physicians are past their prime of life and they cannot be expected to fulfil any additional tasks.

In order to assess the effectiveness of spa treatment the following requisites had to be provided.

1. Three doctors were chosen who were active in a spa establishment and attended to sixty patients each. All of them were internists, two of them balneologists, one of them in addition was specialised in gastroenterology and one in social hygiene. This facilitated a good basis for judgment, as even the youngest of us had seven years of practice in this specialisation.

2. At the beginning of the project I asked my colleagues to make a written assessment of the patients' ability to work in the medical report only after completion of the course of treatment without letting them know that I intended to compute the results statistically.

3. A group of patients was used for the study who took their course of treatment in winter because we know that the cold season can have a bearing on the effect, especially in such cases in which the principal ailment is accompanied by other diseases.

In principle it may already be stated that the unfavourable influence of the cold season on the success of the Karlovy Vary cure is overestimated. We have not found a substantial difference in our case histories, though of course special attention is always devoted to providing

the most favourable conditions. The bed-rooms and lounges were well-heated, the baths in the immediate vicinity of the accommodations, and drinking cures and other procedures were, wherever possible, administered at the bed-side.

In Soviet literature winter spa cures in Karlovy Vary were also mentioned by Donskoy, Lubinets, and Getmanseva. In evaluating the differences between summer and winter treatment, these authors use several criteria. They arrived at the conclusion that there was no substantial difference between summer and winter cures with regard to the final result. The conditions in our spa system, I think, oblige us to examine the possibilities of extending the "spa season" of the summer from all aspects. We can fulfil the requirements of an all-year spa season only if we understand the problems connected with it and especially if we realize what prevents the extension of the so-called season.

To return to the subject: our considerations are to lead not only to a determination of how many disabled persons regained their ability to work once more having taken spa treatment, but explain certain other factors that could have had an effect on their disability in one way or another before the beginning of the cure. I am thinking especially of the work hygiene aspects, the age of the patient, his possibility to eat according to the diet prescribed, etc. We must also not forget iatrogenous influences, as well as the results of earlier spa treatment. These questions must be given due importance in writing down the case history. The general questionnaire for our medical reports allows for a family case history, overburdening of the patient with public functions, women who have too many household duties, but for the purpose of gastroenterology it is also necessary to enter how many meals the patient is used to take, whether he keeps a diet, whether he can interrupt his work if he needs to rest, etc.

We thus strove to determine the immediate influence of spa treatment on the patient's ability to work. The average duration of the cure was 28 days. We made use of the right to prolong the time of treatment only in very exceptional cases — in thirteen, i.e. 1.31 %, in all. Every proposal to extend the cure was examined by a consilium, X-ray, and laboratory tests. Extended treatment was approved only when our diagnosis differed from that on the recommendation for spa treatment and a prolongation was justified, or if the results of clinical and other tests differed persistently from those taken at home before treatment.

I am of the opinion that the duration of spa treatment is often extended where no specific plan of treatment can be made.

This is usually due to insufficient reasons given in the recommendation for spa treatment and the utilisation of old, no longer valid results given by the doctor at home. Every additional examination of the patient in the spa shortens the actual duration of the cure and reduces the number of spa procedures. For that reason the initial examination of every new patient is made on the day of his admission and all other examinations are made within two or three days of his arrival if possible, in order to leave a maximum time for spa procedures.

This has almost always been possible. In order to reduce any possible sickness during the cure to a minimum, we have also used antibiotics with our patients. But the number of cases in which they were applied is so small that no conclusions can be drawn concerning its influence on the course of treatment.

190 (19.02 %) of the patients were given only dietary treatment, a drinking cure and physical procedures.

With 759 (75.9 %) of our patients this treatment was combined with pharmacotherapy, in which of course, taking mineral water is pharmacotherapy *sui generis*.

And finally we also combined the drinking cure, diet, balneotherapy, and pharmacotherapy with antibiotics in 14 cases (1.4 %). The fact that almost one fifth of the cases could do with only the classical methods of the Karlovy Vary cure without medication, shows their effectiveness. In this group we also recorded, as an important effect of this method, the restoration of the ability to work in 46.84 % of the cases.

Unfortunately there are many spa guests who do not take sufficient balneotherapeutic procedures and prefer simply to depend on proven medicines.

This is regrettable because it unnecessarily increases the cost of spa treatment. In this connection we must insist above all on a stabilisation of the physicians and spa personnel to achieve the desired effect of balneotherapy. For statistical purposes we have allowed the physicians complete freedom in the choice of methods and that is why I believe that about 80 % of the spa patients who need medication corresponds to the norm of effective spa treatment of the Karlovy Vary type. We always proceed from the premise that the therapeutic agent in a spa should be nature, a favourable combination of natural curative methods in the course of treatment in conjunction, of course, with dietetics, electrotherapy, and remedial exercises. We put special stress on the educational importance of the diet, because ability to work and its maintenance is above all dependent on a good diet, even if we realise that this regimen is often broken by the patients themselves even during their stay in the spa. We must bear in mind that keeping a diet requires not only a firm will but (especially at home) time and money. That is why I would not like to draw any statistical conclusions from treatment by diet. Wherever it seemed desirable we told the patients and their family doctors to pass on gradually to a normal, rational diet.

We know, of course, that the return of the ability to work in special cases is not due exclusively to the effect of the treatment. That is why our statistics does not include cases in which it was clear that the patient was sent to a spa as being "disabled" only to enable him to take the cure outside his regular holidays from work.

It would be insincere not to point out those cases, even if fortunately they are exceptional. We have also excluded those who had been recommended for spa treatment as being unable to work but who had meanwhile been back at work and who, according to regulations (with the

exception of six months after stomach resection) could not be put into the category of sick persons by us. In our material this concerns 5 patients in all, so that we handled 994 medical records. We are convinced that these small shortcomings will be eliminated in future by a more thorough functioning of the medical commissions that approve applications for spa treatment. Immediately after the conclusion of the cure we declared 412 patients or 41.45 % as being unable to work. We also know that a considerable group of spa guests regain their ability to work only after a certain time after completion of the cure at home. This is true especially of diseases of the digestive tract, with which after the appearance of the "reaction", the general condition of the patient is usually substantially improved. We know from the testimony of numerous patients that they continue to be without complaints for many years after spa treatment and often without requiring even out-patient treatment they can follow their various professions. It is of course difficult to gather objective data about this group. This is possible only in cooperation with the doctors working at the enterprises, who, especially in the large industrial plants, have complete files of their patients with digestive disorders and record every case of work disability and its duration. We are currently conducting a poll to this effect in a number of enterprises, including a motor works, in which a specialist, i.e. a gastroenterologist and spa physician, follow up the development of the patient's ability to work after spa treatment. This is also valuable for prevention, because in this way it is possible to select the patients who wish to repeat the cure. We imagine that in this way the initiative for recommending spa treatment will gradually be passed on entirely to the physician.

Incidental with this I would like to touch on a problem that is connected with this:

The health insurance system does not want the spa physician to recommend spa treatment himself. But we are often confronted with the question of whether a repetition of the cure would not be desirable from the point of view of stabilising its effect. We spa physicians do not want to be patronising towards the family physician. We strive to convince the patient who often insists on a repetition of spa treatment that it would not be advisable wherever we are not certain of its success. Scores of years of experience of the Karlovy Vary balneologists, however, point to a repetition of treatment in certain cases, especially those in which the secretion of peptic juices is upset or in cases of cholecystopathy. If we succeed, in cooperation with the family physician, in selecting the proper cases for a repetition of the cure, we shall without doubt be able to increase the effect of spa treatment even more.

Statistics show that women patients outnumber men, an observation which is common in Karlovy Vary.

There were 555 women in our group and 444 men. This may be partly due to the fact that places in spas given to female dependents (members of the family) of insured persons are substracted from the quote of persons with work disabilities. It is interesting to note how many men,

respectively women, were declared able to work immediately after the cure, considering the various diagnoses. For example :

Diagnosis	men	women
540	11	4
541	47	16
543	12	6
whereas :		
584	11	105
585	17	64

It is a known fact that diseases of the biliary ducts are more frequent in women.

As an increasing number of women have become gainfully employed in recent years, their proportion in the number of spa guests also rose, and not least of all because in Czechoslovakia spa treatment is given free of charge to employed persons insured under the national health insurance system, among whom women are again represented in many professions.

In order not to make a mistake in judging a housewife's ability to work, we also took into consideration the type of household, whether rural or urban. In this way we were hardly forced to declare a woman patient who looked after her own household as being unable to work at the end of the cure. In this we bore in mind that a housewife, despite her often strenuous work, does enjoy certain advantages. She can adjust her work to her own disposition, prepare dietary meals for herself, etc.

I have the impression that a "professiogramme" should be made up for the work of the housewife so that we can arrive at similar objective criteria as in other, well-analyzed professions. It should certainly be interesting to ascertain what influence mechanisation of the household has on reducing the disability to work among housewives. This is one part of a series of interesting questions to what extent rational spa treatment in combination with a higher living standard are capable of improving the health of the people in general. Here the physician's sense of responsibility must be the impulse for his scientific and public activity.

II.

The role of spa treatment of a number of chronic ailments, especially those that are gaining in socio-medical importance from year to year, within the framework of practical medicine should not be underestimated. Along with progress in pharmacotherapy and surgical treatment of these diseases, we observe a growing interest on the part of the public in therapeutic methods in which rehabilitation is principal. This is demonstrated by the ulcerous disease primarily, because it involves a complex

of symptoms familiar to every physician and often becomes a veritable "crux medici".

It is evident from more recent literature that gastric and duodenal ulcers are not at all limited to middle-aged persons, as was formerly believed. An increasing number of cases in early childhood have been observed in clinics and sanatoria as well as in the geriatric age group. In Karlovy Vary, for instance, we had to establish a special sanatorium for children to meet the requirements of the pediatricians. This fact has taught us to devote even more attention to the preventive aspects of the ulcer problem and to seek new ways and means in out-patient treatment that will reduce the great damage to health and the economic consequences of the disease for the individual as well as for society to a minimum.

It has been known for many years that a cure in Karlovy Vary shows good results with ulcers of the stomach and the duodenum. We do not propose to go more deeply into the question of how this effect was determined empirically and beyond doubt. One thing is certain — that the drinking cure of the well-known alcalic-muriatic-salinic thermal water played the main part in the success of the cure. On the other hand, we would not like to miss the other curative agents such as baths and peloid-therapy, diet, climatic-biological influences, remedial exercises, and others. Thus it evidently involves an intensive reorientation of the sick organism whose nature is made most plausible by the Pavlov theory of the condition and unconditioned reflexes as well as the role of the central nervous system. If we are to formulate the purpose of spa treatment in this sense, we might say that it is culminated in the education of the patient not only with regard to this mode of life after the cure but his true understanding of the symptoms of his ailment. We know that in this respect (stress at work, diet, sport) there is considerable ignorance. That is why educational activity has been playing an increasing role here in the past few years which is the sphere of competence of the doctors, nurses and dieticians of the spa establishments. There are various statistical reports (Hanycz, Bureš, Donskoy) about the immediate effect of the cure on the objective condition and the subjective complaints of our patients, as well as earlier publications by Mixa, Syllaba, Fried, and Arany. But of course only information based on long-term observation is of value here.

Before only the subjective testimony of the patients, who returned to the spa for subsequent treatment, formed a basis of these findings. For understandable reasons this was not possible for all. In addition the methods of treatment applied were not at all uniform until recently and were chosen according to the personal experience of the spa physician, the condition of the patient, the duration of the cure, etc. That is why we were especially eager to lay down a generally coherent therapeutic procedure and to put those physicians in charge who were in fact able to observe the patient over a longer period of time by means of regular check-ups. It was also necessary to decide on certain constant and uniform criteria in judging the effect of the cure.

In order to make the medical records conform to a certain pattern as much as possible, we chose patients who worked in a steel mill and whose working and living conditions were relatively similar. In this we were guided by our experience concerning the influence of hard physical labour on the development of an ulcer. None of the cases had been ill for more than five years before the cure and all patients were middle-aged. Upon their arrival at the spa they were introduced to me by the attending spa physicians, the course of treatment was decided and any necessary laboratory tests were made. After their return to their place of work their condition was controlled by a specialist in gastroenterology at the factory clinic. The condition of the patients was checked at three-month intervals.

It is in the nature of an experiment like this to have certain shortcomings. The most important is that the patients whose condition is substantially improved do not always respond to invitations for check-ups. This has an unfavourable statistical effect. That is why our report is limited to only 24 cases although the original group was much larger.

The group is composed of 21 men and 3 women. In the medical report we consider the following of special importance —

pains (we tried to exclude other subjective sensations),
all kinds of dyspeptic symptoms (nausea, vomiting, burning, heartburn, feeling of pressure),

stool (whether pathological or normal),

diet (to what extent it was kept, including smoking and drinking of alcoholic beverages).

We followed these objective factors —

weight,

blood count,

X-ray tests,

secretion proportions.

The anamnestic information and the objective findings were controlled from the beginning of the cure, later on after three, six, and twelve months. It was also noted how often and for how long the patient was disabled from work after the cure.

Before the beginning of the cure in Karlovy Vary, 21 patients had complained of pains (87.5 %). Only 12.5 % were free of pain. After three months we were able to control only 15 patients. At that time 13 (86.6 %) were without pain.

After six months 20 patients were examined, 8 of whom complained of pain and 12 (60 %) were completely without pain.

The examination after one year was possible with 16 patients, 11 (68 %) of whom were without pain.

Dyspeptic symptoms of various kind were found in 18 patients, i.e. 75 % before the beginning of the cure. After 3 months (15 patients were examined), 9, i.e. 60 % showed dyspeptic symptoms, after 6 months (20 patients examined) 6, i.e. 30 %, and after one year 6 of the 16 patients examined, i.e. 37.5 %.

One of our patients passed through normal gravidity during which she had no complaints of any sort.

It is, of course, especially interesting whether and how many of the patients kept a mild diet, which we consider to be one of the factors in the improvement. According to our records this was the case with 10 patients. They had observed the rules for a whole year that we had given them here personally. All patients also received pamphlets with practical instructions and advice before they left the spa. In the group that was observed for the period of one year, 62.5 % observed the dietary rules. It is of course not possible to draw conclusions from this fact as to what extent the Karlovy Vary cure, and the diet had contributed to the marked disappearance of dyspeptic symptoms. We absolutely do not regard these two methods as being opposed or competitive, but stress the joint effect of both. If the diet alone were decisive for the result, the percentage of the positive cases would have to be bigger.

In this brief report I would like only to analyze the X-ray tests now, that were taken in the last group (check-up after one year). Of the 16 patients examined, 6 (37 %) had a clearly distinguishable ulcer, 5 (31.25 per cent) had a scar on the place where the ulcer had been, and 5 patients (31.25 %) had a negative X-ray test. On the whole a substantial improvement of the X-ray tests was shown in 62.50 % of this small group within a year.

We fully realize that ulcerous diseases are inclined to remissions of all kinds and understand this on the basis of their exceptionally complex pathogenesis. The day set "12 months after completion of the cure" can thus not yield a perfect picture but only a cross section. We also know that it is necessary in many cases to repeat the Karlovy Vary cure in order to achieve a lasting effect. With typically chronical conditions such as ulcers of the stomach and the duodenum we can speak only of a single, four-week spa cure as giving rise to the desired conditioned reflexes, not of establishing them firmly.

We should like to compare our modest material with the much bigger statistics compiled by Bureš in 1958 which records the subjective testimony of the patients and their ability to work in the space of one year. According to these statistics, 47 % of the patients were without complaints 12 months after the Karlovy Vary cure and 48 % had occasional trouble. According to the findings of this author, relapses occurred in 25 % of the cases within one year and in 43.8 % within two. The higher percentage of patients who were free from pain is explained by the relatively small number of cases observed. In any case the number of relapses within one or two years after treatment in Karlovy Vary is very encouraging for recommending this cure.

Gastroenterologic Research in Czechoslovak Balneotherapy 1945—1965

J. Kolominský, M.D.

1945 offered an opportunity for the Czechoslovak spas to realise an old plan: to put spa treatment on a purely scientific basis and to specialise the various spas without having to consider their former, purely commercial, character. Special credit and appreciation are due to Cmud, Leno, and Joachim in this development.

The problems of balneological research in the field of diseases of the digestive tract can be summed up in two points :

1. to follow up the rich tradition of the West-Bohemian spas,
2. to answer topical questions that the Czechoslovak spas faced after the socialisation of health care in 1948.

These were by no means easy tasks considering that at that time the spas were managed by various authorities and that there was a shortage of physicians and especially of experienced balneologists. In spite of this, a number of well-equipped and clinically operated sanatoria were opened between 1949 and 1951 in the three major West-Bohemian spas. A fundamentally new organisation was put into practice here in which the experience of those spa physicians who had headed similar institutes before the war (A. Fried and J. Miessler in Karlovy Vary, J. Mates in Mariánské Lázně) was of great value. Based on the tradition of Czechoslovak research in balneotherapy of diseases of the digestive system and metabolic disorders (J. Pelnář, J. Syllaba, M. Mixa, B. Heida, J. Vančura), Joachim built up a research institute in Karlovy Vary between 1946 and 1949. This was the first clinical research institute in Karlovy Vary established to deal with topical problems from the very beginning and particularly with post-treatment of hepatitis and ulcers.

Around 1948 balneology adopted the ideas of Pavlov, which explain the mechanism of the effect of spa treatment on the patient especially by means of the normalisation of the connection of the cerebral cortex and the inner organs. This theory of nervism found full application in the new spa establishments in Karlovy Vary and other spas, especially in the form of the "therapeutic regimen" rather than in the physiological effect of the cure. Clinical research in the sphere of gastric diseases shows that drinking carbonated sulphate chloride water is justified in

the light of recent physiological discoveries concerning peptic secretion which applies to hyper-secretion, hypermotility, as well as to superacidic dyspeasias. The drinking cure has a regulating effect on the digestive tract and moves hypo- and hyper-functions towards normal. This is also proven by other experience. Experiments have been conducted with the help of vegetative tests to determine the effect of spa treatment of gastric diseases. In this the experience of the drinking cures in various Slovak spas (Bardějov, Nimnica, Korytnica) was very useful for us.

The method of treatment of ulcerous disease in the spa has been studied by K. Bureš, J. Kovařovič, and A. Fried. In this the main emphasis is placed on the observance of a well-planned spa regimen and a regulated way of life, in which diet, regular rest, remedial gymnastics, terrain cures, hydrotherapy and a drinking cure all play important parts. Treatment with induced sleep has not been successful. Post-treatment of recent gastro-duodenal ulcers was limited to certain spa establishments. It has been proved repeatedly that spa treatment reduces the intensity and the frequency of relapses of ulcerous disease, eliminating it to about 50 %.

In recent years the number of our patients after stomach resection has gone up and now constitutes, including post-cholecystectomy syndromes, more than one third of the spa patients in Karlovy Vary. Here rehabilitation after surgery, the strength-giving diet, the correct proportion of rest and therapeutic exercise are of principal importance. Studies made in the past few years have shown statistically (checked against control groups that did not undergo spa treatment) that this form of post-treatment after stomach resection regulates digestion and has a favourable influence on the function of the stump and the intestines as well as that of the neighbouring bile ducts and the pancreas. It was also found to act favourably on the content of iron in the blood and on the blood count.

With regard to spa treatment of liver ailments our research programme followed up the experiments of E. Stránský, who was able to prove the positive effect of a Karlovy Vary drinking cure on choleresis and the anti-toxic function of the liver, as well as the process of fermentation and glycogenopexy. But it was the extensive epidemics of hepatitis after the war that were the reason for more comprehensive research. It was shown by Joachim that spa treatment soon after an attack of hepatitis, as had been the practice after the war, was not advisable. On the other hand, though, it was shown that the Karlovy Vary cure was very effective with chronic post-hepatic fatigue syndrome, dyskinesia of the biliary ducts and the duodenum, with hyperbilirubinaemia and posthepatic dyspepsia. This problem was also studied with the help of enzymatic tests, that showed the dynamics of the liver functions during the drinking cure and made possible individual preventive measures in every case of chronic damage to the liver. The effect on cases of permanent impairment of the liver with a trend towards fibrosis is not yet clear and is the subject of further study.

Karlovy Vary (Carlsbad) was already well known for its results in

the conservative treatment of diseases of the biliary ducts in former years. This fact has been examined from various new aspects more recently: the draining of the gall bladder in acute as well as chronic stages was examined biligraphically after application of warmth and a drinking cure, as well as the reactivity of the gall-bladder system in the course of a drinking cure, and the influence of repeated cures on pacifying cholelithiasis. New perspectives concerning the mechanism of the effect of the Karlovy Vary springs on the secretion of the pancreas enzymes and the release of pancrozymine were opened up by J. Benda, A. Svatoš, and V. Vokáč.

Even if our viewpoint concerning spa treatment of cholelithiasis is still under discussion — primarily because of the small risk of operation today and prophylaxis against complications by means of manometry and cholangiography — it has already become evident that spa treatment has its justification, especially when functional, particularly spastic disturbances predominate, as well as with moderate, subjective complaints and rare attacks of colic (biliary dyspepsia), with solid concretions in the gall bladder, as well as prophylactic treatment of the so-called lithiatic terrain and finally with syndromes of cholecystopathy with obesity, arthroses or diabetes, constipation, menopause, chronic pancreatitis or in any other cases in which, for any reason, surgery is not indicated.

Numerous physicians (K. Herfort, J. Mašek, and others) consider the Karlovy Vary cure after cholecystectomy a rational prophylaxis against possible complications or relapses. In two thirds of all cholecystectomy cases all complaints disappeared after spa treatment.

The principal purpose of balneological research of diabetes, which is one of the typical indications for Karlovy Vary and Mariánské Lázně, was a comparison of the results of spa treatment with those of therapy by medication. The studies made by Mates of Mariánské Lázně and Havránek of Karlovy Vary confirm the success with medium and light cases. A similar result was also shown by the statistical study of 1,000 diabetic patients who were treated in Karlovy Vary in 1961 and on whom an improvement of the carbohydrate metabolism could be proved as well as an influence on the weight of the patient and his general condition. But what we consider by far the most important task of balneotherapy is to arrest, with the help of complex spa treatment, the mushroom growth of complications that accompany diabetes — vascular, renal, and neurological complications — especially in middle-aged or older patients. This was stressed at the XX International Post-Graduate Medical Course in Karlovy Vary by Professor Root, a pupil of Joslin. The Karlovy Vary balneologists therefore strive not to explain the favourable influence of the treatment only by the carbohydrate but by the lipid metabolism of the diabetic patient. Similarly new methods are being tested in the treatment of obesity (Doberský). Research in the field of balneological gastroenterology was developed in conformity with the needs of our public health system in the past twenty years. Our spas have become an important factor in the treatment and prevention of numerous ailments.

The spa statutes of 1956 stress the importance of the independent economic development of Karlovy Vary and its health care. It is for this reason that the branch research institute for balneology was reopened here in 1958 and the tradition of the international post-graduate medical courses as well as other congresses was revived. The building of new spa establishments is envisaged in the next few years. In our country, in which 280,000 patients — both from Czechoslovakia and abroad — take spa treatment each year, we consider balneology an effective prevention of chronic, especially of the so-called civilisation diseases, and a key to prolonging human life.

(Literature available at the author's)

The Effect of Thermo-Physical Stimuli on the Digestive Tract of Healthy and Sick Persons

J. Kolominský, J. Šetka

The function of the digestive organs is, as is commonly known, influenced by many different factors. Among the most important of these are the cortico-visceral, viscero-visceral, and local stimuli (so-called local reflexes according to Bayliss and Starling), which, among other things, are set off by the taking of food. In addition to these nervous, there are also hormonal influences, wither from outlying glands or from the intestine itself. It is not easy to prove these connections. In practice we depend on X-ray, cinematography, and manometric examinations (in which various systems of inserted ballons, electro-manometers and transistors are used), as well as direct observation of the mucous membrane of patients with entero-, respectively colostomy. As the large intestine is easier to reach than other sections of the digestive tract, experience has been gathered about that part recently which has a general application. Here the influence of the above-mentioned factors were proved on motility, tonus, blood circulation and mucous secretion. As various authors report, there is a certain relationship between blood circulation and the application of warmth. It can thus be concluded that a change in the temperature of the mucous membrane has an effect on the changes in the blood circulation, respectively on the function of the colon.

We were interested in how the mucous membrane of the digestive tract of a healthy person reacts to the application of warmth, how that of patients with an irritable large intestine and ulcerous colitis, i.e. ailments of an uncertain pathogenesis, react to it, as experience shows that patients with an irritable colon are relieved after certain physical procedures. And vice versa: this syndrom as well as ulcerous colitis are usually aggravated after inadequate endo- or exogenous intervention.

Grace, Wolf and Wolff showed in 1951 that in patients after colostomy a change in the colour of the mucous membrane and its blood circulation indicates the activity of the colon.

Graysom determined the blood circulation by taking the temperature where colostomy was performed. In this he found that the application of cold on certain parts of the skin, on the upper extremities for instance, causes vasoconstriction, but in the colon vasodilation and stimulates the blood circulation with a simultaneous rise of temperature and higher blood pressure. Removal of the source of cold leads to vasodilation in

the skin, vasoconstriction in the mucous membranes of the intestine, and both reduced temperature and blood pressure. If the stoma is infiltrated with a procain solution, these symptoms did not appear. In this, tying up the extremity before the experiment with the cold, remained without effect on the changes described above. He therefore rightly assumes that it involves a reflex mechanism. Welsh and Wolf arrived at similar results in 1960.

We have studied the effect of warmth on the mucous membrane of the digestive canal in various patients during treatment in Karlovy Vary. The application of warmth in the spa was done in the usual manner :

1. by application of thermal water per os or hot drinking water in single doses of 400 ml and 53 °C,
2. by means of mud packs of 44 °C on the body or the whole torso,
3. by means of peat packs or hot-water bottles on the right epigastrium (T° 42—49 °C),
4. by warm baths of the colon (enterocleaner) of 40 °C.

The effects of these applications were also tested with patients with an irritable colon and an ulcerous colon. The first said that they felt a relief, whereas the effects on the colitis group were dubious.

We know that local application of warmth does not penetrate deeper than 6—8 mm. The reflex must therefore be explained by a reflex action.

We conducted our experiments on 18 patients. In all of them the temperature of a point of the mucous membrane of the rectum was measured and in 4 patients the temperature of the antrum and duodenal mucous membrane as well. The area measured was 1 mm². We used a thermistor-feeler of our own construction. The element was fastened to a metal rod that was inserted with the help of a rectoscope. By putting the source of light sideways and at a distance there is no danger that it will influence the temperature.

The temperature is always taken on the mucous membrane of the Kohlrusch folds, so that the thermistor is used in constant contact without pressure. In this way we prevented pressure-anaemia and the patient did not feel the touch. In taking the temperature of the oesophagus, the stomach and the duodenum, we used a stomach probe 2 metres in length with a balloon into which the element was fitted. In the duodenum we did not blow up the balloon. The sensitivity of the instrument made it possible to measure differences of 0.05 °C after 5 seconds of contact or vacillations in the temperature.

In rectoscopy we also used positioning as well as adaptation of the patient in the examination chamber of at least half an hour while the temperature of the room was kept constant. The measurings were made only when the scale was steady.

Changes in the rectal temperature after various stimulations

1. a) After giving 400 ml of 53 °C mineral water from the Mlýnský pramen (Mill Spring) per os, we observed patients with a duodenal ulcer or an irritable colon. We found a 0.1° to 0.4 °C rise in the

temperature in the mucous membrane of the rectum. The temperature was usually set at that level after 1 or 2 minutes.

- b) In two patients with cholelithiasis (in an intermittend stage) there was no change in temperature. Here the warmth was evidently diverted to the epidermis so that the core was not warmed.
 - c) After drinking water of 16 °C we noted a drop in temperature of up to 0.4 °C. This change lasted for about 30 minutes after drinking.
2. Mud layers of about 5 to 8 cm, of a temperature of 44 °C applied to the abdomen and hips (the patient is wrapped in a rubber sheet and woollen blankets) always led to a marked increase in the temperature of the rectal mucous membrane, as here not only the skin and subcutaneous tissue, but the "core" is warmed as well.
 3. A bag of peat of about 3,000 and 3,500 g and 41 ° to 49 °C, applied to the right epigastrium, caused a drop of between 0.2 and 0.5 °C within 5 to 7 minutes in the temperature of the rectal mucous membrane. Contrary to the previous application, this peat pack acts as a relatively strong stimulant on a limited area. For technical reasons it was not possible to prevent a possible loss of warmth of the epidermis.
 4. Enterocleaner (underwater bath of the intestine). Temperature of the water — 40 °C, quantity — between 15 and 25 litres, duration 10 minutes: here we registered a rise in the temperature of between 0.2 and 0.8 °C. In this the thermistor was reintroduced after the rinsing so that the measuring was uninterrupted for 10 minutes.
 5. Emotions (excitement, laughing, fear, embarrassment, deliberately called forth during the experiment) changed the temperature between 0.1 and 0.2 °C in both directions according to the nature of the effect. We continued to follow this in 15 patients. In patients with ileo- or colostomy, we found similar vacillations in the stoma, but of more marked amplitude (+1.1°—0.6 °C).

Changes in the temperature of the duodenal mucous membrane

The temperature is changed rhythmically after intake of 400 ml of the "Svoboda Spring" water (52 °C), depending on the emptying of the stomach. Before that the amount of water was cooled unevenly but dropped gradually (in our experiment to 39.4 °C, while the starting temperature of the duodenal mucous membrane was 36.6 °C).

The effect of cooling, respectively warming, of the extremities on the temperature of the rectal mucous membrane

Having determined at the II Medical Clinic in Prague that the temperature of the rectal mucous membrane of 36 patients was similarly changed under the most varied influences as in Karlovy Vary, we chose the following procedure:

After 30 minutes the rectal mucous membrane was measured on the usual spot. After that, one hand was immersed in cool water — between

13 and 17 °C — up to the wrist. Before that we took the temperature of the skin between the second and third metacarpus. After drying we put the hand into a warm bath of between 42 and 45 °C.

In 29 cases (3 of the 32 patients reacted differently) the cold stimulus effected a rise in the temperature of the rectal mucous membrane, and the warmth stimulus left it either unchanged or it dropped. The temperature dropped when the patient complained of the bath being intolerably hot.

After these findings we approached the actual problem, i.e. to examine the heat activity of the mucous membrane of the intestine in cases of colon irritable and colon ulcerative. We examined 10 patients in each of these two groups twice each. Five healthy persons were examined for control purposes. In this control group a cold stimulus (a difference in temperature of about 19 °C) always led to an increase of the temperature of the mucous membrane of between 0.1 and 0.3 °C. With the heat stimulus (difference in temperature of about 8 °C) there were no changes with the exception of one case in which the person examined bore the temperature of 45 °C badly.

In the group of patients with colon irritable the cold stimulus resulted in a greater rise in the temperature of the mucous membrane (0.2 to 0.5 °C) with the exception of one patient who had symptoms of anxiety neurosis and who showed no change in temperature after either cold or warm stimuli.

The case of one person who was allergic to milk is of interest: after drinking lukewarm milk (27 °C) the temperature of the mucous membrane rose 0.2 °C after about 3 minutes and audible borborygmata appeared. After 30 minutes the windy spasms subsided and the temperature immediately rose another 0.5 °C and the patient complained of the usual trouble. We applied a peat compress of 42 °C and after 3 minutes the temperature of the mucous membrane returned to the original 36.2 °C and the patient said that the complaint had disappeared. The use of spasmolytics parenteral resulted in neither subjective nor objective changes.

The group with ulcerous colitis reacted similarly as the control group. Only one patient who had more serious symptoms and an irritable colon, reacted paradoxically. Two patients with florid form did not react to the heat stimulus at all. After a biopsy probe of the mucous membrane there was a sudden drop of temperature around the excision (of 0.5 °C).

Results

Direct application of warmth to the mucous membrane of the digestive tract results in a parallel change of the temperature in aboral regions. A relatively small quantity of hot drink effects a rise in temperature from the stomach and the duodenum in the Kohlrausch folds of the mucous membrane of the colon. The rectally measured values are the result of thermoregulating processes in the organism. In healthy persons the vacillations are insignificant, independent of the food taken or

the climatic conditions (Bader, Mach, Kreider, Spurr, Hutt, Horvath, Iampietro, Melette, and others).

Only if the cooling is extreme (applications of ice on extremities) may the temperature measured rectally be influenced (Bligh, Hall, Kearney, and others).

It is often assumed that the stomach adjusts the warmth of nutrition to that of the body temperature. Our observations show that the stomach passes on relatively hot portions of its contents to the duodenum. In taking thermal water in Karlovy Vary (Mlýnský pramen — Mill Spring — 52 °C, Castle Spring 62 °C, Vřídlo 72 °C) their warmth thus acts not only upon the mucous membrane of the stomach or the duodenum, but on lower sections as we have been able to prove.

Intensive heat application on the skin (peat compresses and hot-water bottles) results in a drop of temperature of the "core", i.e. also of the rectum (Ipser), which is without doubt a reflex process.

If the skin is warmed by means of a peat compress (42—49 °C) a vasoconstriction reflex appears. This does not bring about overheating of the "core" and the isothermy is maintained. Only after overcoming this "first defence line" does the heat effect a vasodilation! But even then there is no hyperthermy of the core because in this stage the chemical



and physical regulators function in the organism and blood accumulates in the area under stimulation.

Heating of the entire body (a hot bath, turf compresses of mud packs of the entire torso, etc) raises the temperature of the mucous membrane of the digestive organs. Emotional stimuli that may either intensify or weaken the physical stimulation have a similar effect.

Long series of observations of spa patients with a large variety of physical procedures show that these procedures can have a specific effect on the digestive tract. This means that the reaction of each individual case must be controlled before and after spa treatment. We know that this readiness to react is usually heightened in people suffering from gastric and intestinal trouble and in exceptional cases it is decreased or nil. Our study was an attempt to prove this fact confirmed by experience on patients suffering from an irritable colon or ulcerous colitis.

Our therapeutic endeavours are aimed at normalising the disturbed function. Taking the temperature of the mucous membrane of the large intestine makes it possible to follow the therapeutic effect. This justifies us in stating that physical balneotherapy — as empirism teaches — is an effective agent. But here the principle must, of course, not be ignored that the kind, intensity and frequency of the procedures should be chosen for every patient individually and the necessary competence is expected of the spa physician.

Literature available at the author's.

The Mineral Springs of Western Bohemia

Arthur Weiss, RN.D.

The mineral springs of Western Bohemia are of great importance for the national economy. They have not only become the basic factor in the foundation of the world famous spas but are also used commercially. The dependence of their commercial importance upon a number of factors, however, is not always properly understood. Some of these factors are sometimes regarded as subordinate and it is supposed that improvisation is good enough to reduce costs. It ought to be remembered, however, that all industrial enterprise is determined by different technological and economic conditions — not to mention the required precautions for maintenance of safe and hygienic production. Here, as elsewhere, the quality of the product must come up to the requirements of the consumers and the state norms derived from them.

The processing of mineral water involves the production of medicinal mineral salts, bottling of medicinal waters and above all the sale of table-water which is sometimes treated with syrup, fruit or juices. That means it specialises either in medicinal water or in soft drinks. This circumstance requires the close observance of all hygienic requirements, particularly the safeguarding, cultivation and maintenance of the springs themselves.

It is therefore necessary to make perfectly sure of the immaculateness of the spring before starting its exploitation. This has to be considered with regard to the following aspects :

a) The character of the mineral spring, whether it is to be classified as a source of medicinal water or of table water, according to its mineral content. With medicinal water its pharmacological effect has to be proved, and table water has to be tested for taste as a refreshing beverage and whether its long-term consumption is not detrimental to health.

b) All mineral water ages. Water that ages rapidly is not suitable for bottling. The bottling plant must determine how constant and stable the mineral water is, whether the physical and chemical changes do not take place in the prescribed period for which it is guaranteed, in other words, whether the norms recognised by the state (a stability of 6 months) are guaranteed. Newly-struck springs often change their composition within a few weeks. Mineral substances are precipitated in the form of flakes or salt sediments that form on the bottom of the bottle.

If the water becomes turbid its use is dubious. It cannot be stored even though it may have very good taste when it issues from the earth.

c) Water that is used for bottling must also remain microbiologically and biologically pure like normal drinking water. It must neither contain disease germs nor such micro-organisms that point to pollution as a result of surface or drainage water infiltration. The area of infiltration of these springs varies in size and in depth. The structure of the various strata of the ground through which the water passes plays an important part here. Sometimes the surroundings of the spring cannot guarantee that heavy rainfall will not result in an influx of micro-organisms or animal and human waste products. This is why the springs have to be protected by larger or smaller zones. Only repeated hygienic control authorises its use.

In addition to these basic conditions, others that are primarily of an economic character and involve getting the necessary labour power, have to be met.

The best spring cannot be used if its yield is not large enough. In a modern bottling plant a capacity of 50,000 bottles in two work shifts is usual. As one bottle holds 0.7 litres, it needs 35,000 litres per day. For this the spring must have a minimum yield of 15 respectively 30 litres per minute. More than half of this quantity has to be stored in the afternoon and evening. Medicinal mineral water springs form an exception of a sort here because their use is dictated by purely medical aspects.

In planning mineral water bottling plants enough utility water must also be provided. In the plant is to meet all hygienic requirements, it needs about 6,000 litres of drinking water per hour. The area of some mineral springs is poor in drinking water, and some are removed from water mains. Building special drinking water wells is costly and requires a long time. This is true especially of mountainous areas.

The question of transport must also be considered. Where there is at least a good system of roads it is solved more easily than where everything has to be built first. In considering bottling of mineral water, a year-round market for the product must also be ensured. Seasonal use creates problems in providing labour power. In the vicinity of towns or larger communities the problem is not so bad. It is more difficult in the country, where the building of a new plant also necessitates residential building and all that goes with it.

The principal producer of mineral water and mineral salts in Western Bohemia is the national enterprise "West Bohemian Springs" in Karlovy Vary. It is composed of five plants that bottle medicinal and table water. At the central plant the natural Carlsbad mineral salt and carbon dioxide gas that comes from the springs is filled under pressure into steel bottles. The enterprise considers the maintenance and expansion of the springs as its main task. That is why extensive drills have been made in various places, among others near Františkovy Lázně. The results of these projects are not always equally satisfactory. Sometimes the capacity of the springs that are struck is too small or the composition of the minerals



is not the best; the water of some springs ages too rapidly, others are bacteriologically doubtful. Where the springs are directly in the spas they also serve balneotherapeutic purposes.

The enterprise has drawn up a plan for the construction of a modern bottling plant in Nová Ves. Here bacteriological and hydrogeological examinations showed that the spring has a sufficient yield of very good mineral water. We are now dealing with the problem of supplying drinking water and labour power. The spring is situated at Nová Ves, about 15 kilometres from the railway station. The condition of the roads is still quite poor. For this reason we have to plan considerable investments. We intend to not only bottle the mineral water but to fill barrels with it, which could be used by large consumers like the glass factories

and heavy industry plants in the area. Larger restaurants and hotels could also profit from this form of containers.

The new plant will help meet the increased demand for mineral water, of course only if everything is well considered and well planned and both the quality of the product and economic and social aspects are favourable.

Non-medicinal mineral drinks have the advantage over other non-alcoholic beverages that they not only refresh but promote good health. While working and especially in high temperature the body loses minerals which can be replaced by drinking mineral water. This is why table water is becoming increasingly popular and plays a not altogether insignificant role in the drive against alcoholism.

Diet feeding at Karlovy Vary

Karel Nejdí

Since the days of the old Greeks and Romans it is well known that in order to achieve successful treatment of sick people their mind must be at rest, they must enjoy quiet and eat a diet. The demand for a diet did not mean that patients were required to live on the verge of starvation, on the contrary, the cuisine was called upon to be as tasty as possible and to contain the precise amounts of ingredients of the highest quality.

In the Middle Age medical science, too, was already capable of understanding the importance of a proper diet in connection with applying spa treatment. In Torretta, Italy only light foods were recommended to patients, such as chicken and soft boiled eggs. Patients were advised to chew well and swallow without haste. On no account were patients advised to eat more than half a chicken all at once even if they should feel extremely hungry. It was considered healthy to dip bread into the gravy since this was believed to stimulate digestion. Wine was the recommended drink but patients were warned not to dilute it with water; the drinks were to be taken after meals but no more than half a glass at one gulp. It was not considered advisable to go to bed immediately after each meal but to remain in the dining room engaged in pleasant conversation and to avoid tiring work.

The opinions regarding spa treatment in Karlovy Vary (Carlsbad) after the spa was set up were probably very much along the above mentioned lines. The oldest document bearing witness of these days is the "Daily regimen drawn up for Charles IV" by Master Havel from Strahov, the canon of the church of Prague and Boleslav and the archiepiscopal vicar. He was the private physician of Charles IV and professor at the Prague University. It is assumed that Charles IV carried this little booklet with him during frequent visits to the Karlovy Vary springs, which brought him relief from his ailments. This paper represents one of the most outstanding of Havel's works and is written in a very lively Latin providing us with a vivid picture of this era. (J. Vinař, M.D., "Pictures from the Past of Czech Medicine", page 34—35.)

Since the earliest days of the existence of Karlovy Vary as a spa, great numbers of sick people kept streaming to the natural springs of the spa to recover their lost health. The faith of these patients in the curative properties of the spring waters was unshakable and the preparation for the treatment was in itself a great event in the patients' life. Before leaving for the spa patients were taking laxatives for several weeks and were advised to reduce their working hours, adapt their entertainment, food and drink to the cure, they were about to take.

Not all spa patients took their spa treatment seriously and conscientiously performed what was prescribed to them. Documents reveal that the patient Jakoubek from Vřesovice, who was captain of the Žlutická region, Mikuláš Hasištejnský from Lobkovic, who was captain of the Kadaň region and a number of other honourable guests spent their nights under an open sky on the Town Square drinking mead out of full barrels which had been given to them as a present. It may be taken for certain that their attending physicians were not satisfied with their conduct.

In 1522 the first medical book on Carlsbad was published by Doctor Václav Bayer (Payer), which carries a detailed account of the food and drink available at the spa. Bayer was a learned physician who had acquired his knowledge by studying in Italy and that is why he recommended patients to take the waters in Karlovy Vary a hundred years before such a type of therapy was introduced in other spas. This is what he had to say about food and eating: "Rich food and fruit should be avoided when taking the waters and the baths. Particular care should be taken to avoid ripened Czech cheese since it does not represent an important item in the nutrition and belongs to the type of rich foods which are difficult to digest and have practically no food value. Very well suited, on the other hand, are soft boiled eggs, suitable meat, chicken, partridges, capons, fieldfares etc. In Karlovy Vary it is customary to serve fish and they are prepared in many different ways; mostly they are prepared on butter or bacon, particularly pikes. This cuisine was not invented by any old-fashioned gourmet but is the result of wilfulness. I should rather recommend fish prepared on oil as prescribed by the most highly esteemed physicians. For the substance of oil is warmth and moisture and it is generally used in the whole of Italy. In my opinion it is a great mistake if patients come to our spa in order to regain their health and while taking the baths they lead a much more disorderly way of life than back home. On the days when they take the waters they should take a light breakfast only, chicken and eggs will be quite sufficient and the same also applies to their supper. Only on days when patients neither take baths nor the waters is it not ill-advised to take a more substantial breakfast and dinner."

As far as drinks are concerned, this is what doctor Bayer had to say: "As for drinks the difficulty in this locality is considerable since the local beer is much worse than any beer I have tasted elsewhere. And I am convinced that no other beer can have a more harmful effect on the bladder and kidneys than this. This is verified by the people who like it. The Loket beer is strong and causes tympanism and headaches. And

the stuff they brew nowadays is worse than it was in the past. As far as beer is concerned, I only allow Naumburg beer, if I must make concessions and allow it at all, since it contains ingredients of a higher quality than other types of beer. In this case, i.e. for people taking the cure in our spa, it is a strengthening beverage and has a uretic effect and there is no headache. And I know no other beer which could stand comparison. I therefore advise all those who have the opportunity and who want to come to our spa, to get Naumburg beer. If they do not want it, Freiberg beer may also be admitted. But this beer is much worse for people taking our waters. In Bohemia there is a type of beer which is called light beer and which is made from wheat. I particularly agree with patients drinking this beer on the days following their taking the waters, after they have finished the drinking cure. But while patients drink our mineral water I do not agree with this beverage, as it is too cold, with the exception of instances when patients suffer from great thirst or from burning sensations when urinating, for on these occasions it is excellent."

As for the drinking of wine, doctor Bayer stated: "The astringency of Czech wines is similar to the wines of Thuringia and that is why they are less suited for the cure in our spa. That is why I recommend in the first place Rhine wine which is white and weak. If only strong wine should be available, take baked bread and dip it in the wine. This makes the wine weaker and then you may drink it. The amount of wine after taking the waters should not exceed half a tumbler. This also applies to drinking wine at night, but it is more advisable to refrain from drinking wine at night. If the patient drinks beer he should not drink more than the smallest quantity. If patients want to drink beer as well as wine, they should start with drinking wine and finish their meal with one draught of beer. The reason for this is provided by the fact that cold water may easily be drunk after meals and other drinks. But as far as possible, patients are advised to refrain from drinking wine while taking the waters, unless this is urgently required from some other reasons."

The physicians of the later period also held similar views as far as patients' diets were concerned and it was in the same spirit that the first institute of dietics was run which was set up at the beginning of the seventeenth century in Karlovy Vary, if this term can be applied to the first institutions of this kind. High-born patients very frequently took their own cooks to the spa with them, but there were also many patients who came to the spa without their own kitchen. For this reason a special licence was granted in 1610 by the Town Council to the owner of the "Planeta" house on the Market Square to cook meals, pastries and other food suitable for spa patients who require his services. The meals were carried up into the rooms of spa patients who were staying in the different establishment.

These first dieticians were advisers on questions of spa dietics whose advice were greatly valued but there is no documentary evidence of their activities. But some of the hints given by the doctors of the old days to their patients are rather queer. The doctors of the old days considered it advisable to eat fresh butter sprinkled with cummin, or roast chicken,

but for supper only cooked chicken was allowed. Only warm beer was recommended as a drink after meals. The dieticians of the old days knew very well what their patients were allowed and that is why they were only very rarely exposed to banned temptations. All kinds of meat were used with the exception of pork; game was very popular except boars. The kitchen was usually well supplied with chicken, ducks, pigeons etc. Goose were completely banned from the patients' menu for the dieticians of these days regarded them as just as heavy to digest as pork. The most recommended food were eggs. Vegetables banned by the dietician included cabbage, radish, lentils, beans and raw fruit. Particularly renowned were the Karlovy Vary pastries. But the general principle applied in the diet of patients was temperance in food and drink. The slogan: "We eat in order to live but we do not live in order to eat" was repeated over and over again. This slogan was very handy for the dieticians as well as for the owners of restaurants and hotels who later took their place.

The beginning of the nineteenth century was marked by a sharp struggle whether coffee, cocoa or tea should be served for breakfast. The well-known Karlovy Vary physician of French origin, Jean de Carro who studied medicine at Edinburgh University, decided this struggle in favour of tea which was so popular with the English, Polish and Russian patients. The old generation of Karlovy Vary doctors kept assuring their patients that the iron trioxide of the Karlovy Vary spring and the tannin of the tea cause a constiction of the stomach. At that time there were already a number of restaurants in Karlovy Vary, where the menu for the day was advertised every morning by many restaurants in the closest vicinity of the spring where patients were taking the waters. This enabled patients to make their choice for the day.

Jean de Carro is highly appreciated for his great merit in developing the Karlovy Vary cure and introducing quite new and modern ideas into all aspects of the therapy. That is why it is also worth mentioning his views on the Karlovy Vary diet which he related to his friend, the Karlovy Vary historiographer A. L. Stöhr in 1830: "What I should like to achieve in the first place is to improve our Karlovy Vary with the ancient Sprudel, describe the work of its physicians and citizens, to praise the merits of the town and to attract the attention of the French-speaking world to our natural springs. If my views on beds and feather-beds may seem ridiculous to some, I am sure that our guests will bless me for it if they will finally help in making Czech beds short and narrow as is customary in Europe. If our doctors knew the customs and needs of our foreign patients, it would hardly be possible to have such guest-rooms and such diet kitchens as we can see nowadays. The meat is left on the oven until it is absolutely dry and the roast meat drives patients to desperation, lean and sick chicken should also be kept well away from our dinner tables. I do not wish to introduce French manners into our kitchen, but I do want my patients to receive juicy food without a baked crust, meat which is not grilled, poultry which was neither fed artificially nor castrated. I do not want veal of calf which were slaughtered a few days after they were born. The art of cooking and the art of eating is

on the decline in our foremost restaurants and slumbers away. If I shall live long enough I shall put our cooking in order again and in fact I have already done this on several occasions. Maybe you will underestimate my efforts to improve the cuisine but to enjoy a refreshing sleep and nourishing food are matters of enough significance to deserve the doctors' attention; and these principles are still neglected in our spa."

The efforts of Jean de Carro were not in vain. In the second half of the nineteenth century an enormous number of special booklets by doctors from home and abroad dealing with questions of dietics was published. The efforts of all these people brought the preparation of the spa cuisine to such a degree of perfection which was quite remarkable. In 1906 the French Academy of Sciences sent doctor Gaston Parturier to



compare the balneological standards of Vichy and Karlovy Vary. Dealing with the subject of the diet in Karlovy Vary doctor Parturier wrote: "In all restaurants people eat at small tables and the menu contains simple foods, which might appear dull on first sight, but are prepared in perfect diet kitchens. Patients are lead to eat slowly, unperturbed by the haste of the management. This same tranquility is also apparent

during lunch and dinner and excellent musicians generally play throughout lunch or dinner to sooth the impatientes of the guests. By decision of the Hotel and Restaurant Owners' Committee all meals are prepared according to recipes drawn up by the doctor."

In the months preceding the First World War this dietary regimen was less severe and Doctor E. Ganz could write: "Parents or friends accompanying patients can now receive a turkey with truffle and a glass of champagne in the restaurant."

The present-day spa therapy relies on traditional as well as modern achievements of medical science and the diet represents one of the most important features of the therapy. The standard of the Karlovy Vary diet feeding was entrusted to physicians specialised in dietics, diet nurses and trained diet cooks to ensure the best service for the spa patients.

Radon Treatment in Jáchymov

Josef Slánský, M.D.

Microcurie-therapy, the administration of small doses of radon for curative purposes, is rarely a subject discussed at radiologic conferences. For obvious reasons attention is focused on irradiation treatment of malignant tumors and the problems of radium-isotopes, mainly because of their diagnostic and therapeutic possibilities. But it would be incorrect to neglect radon treatment, especially in those spas in which there are radioactive springs, as for instance in Jáchymov in Western Bohemia. At any rate the effects achieved in cures here are noteworthy.

The number of spa guests who come to our spa because of ailments of the spinal column and pains connected with them, is growing constantly. It should of course be admitted right here that many questions connected with this, particularly questions of a theoretical nature, are still waiting for a clear answer and that we are often forced to work on a purely empirical basis. Above all we labour under a constant shortage of specialists in this interesting field.

In order to explain the curative effect of radon on vertebral and other diseases of the joints, for a precise definition of the indications, I should like to say something about the biophysics and the biological action of radon.

90 % of this is constituted by the ionisation of the tissues by means of alpha rays. Beta and gamma radiation seems to play only a subordinate role. The alpha-particles have thanks to their double positive charge, a much stronger ionisation effect than protons or electrons. The density of the beams is three times as big with the first than with the after two. The total ionisation effect of the alpha rays exceeds that of the beta or gamma rays twenty times. The dimension of the alpha ray beams sheaf is somewhere between 5 and 40 millicron (Jordan, Jaffé).

In alpha irradiation of viruses Bonet-Manry found that the alpha particles yield a sensitive volume that corresponds to that of the virus particles. It involves a shift of the energy in which the inactivation of the mass of particles by beta rays can be observed. Proof is given by crystal luminescence and the formation of a latent photographic picture. Alpha irradiation can cause this effect in almost every material and influence individual particles of considerable size if they are limited in any way.

The effect of this radiation is thus very significant even if it is not very deep (in tissues about 0.06 mm). Its action is primarily of a physical and chemical nature. It is evident from a number of experimental works (Epstein, Hardy and others) that radon reduces the charge of electro-negative colloids, which results in a rougher distribution and in turn effects its discharge especially in the albumen of the plasma and the cell walls. Similar processes however also take place outside the cells in the serum, in liquor, etc.

The changes in the cells react upon the cell wall and the cells themselves. It is therefore an indirect action. Radiation also forms hydroxyl-radical and free hydrogen atoms. As early as in 1944 Weiss held that these radicals lead to a chemical effect in ionisation. The ionisation of water yields not only OH but H_2O_2 and O_2 . It may therefore lead to reducing as well as to dehydrogenising, respectively oxidative processes. (Lea 1947.) This is presumed to be the reason for the varied and complex chemical answer to ionisation.

The changes in the colloid distribution in conjunction with the chemical transformation as a result of alpha rays of radon explain, according to Kühnau, the unspecific irritation effect of radon treatment. Janke, Rathery point out that as a result of irradiation excretion of waste products increases, Schiller, Stoklasa and others consider the higher assimilation activity a result of beta and gamma rays of the disintegration products of radon.

The effect of radiation on the cell nucleus is of lesser importance in the microcurie therapy. An influence on the sensitive substance of the nucleus (chromatine) is relatively rare. The sensitive nuclear substance must be hit by at least three alpha rays in order to be destroyed (Herčík).

According to Gray a reduction of mitotic activity sets in only after 6 days of irradiation with alpha particles, but is more marked than with gamma irradiation, with which it may be observed after only three hours. The effect of the alpha rays remains constant after one minute or after 24 hours.

With radon treatment this effect is shown mainly on the nucleus-rich tissues which large nuclear substances, especially on the leucocytes and the cells of the marrow of the bone. An early leucocytosis (up to 85 % of the initial value) is followed by leucopenia about 20 hours after radon treatment. In this it probably involves a complicated delayed reaction of the marrow of the bone to the action of the myelotrophic agent, an active radon deposit. The simple explanation of a delayed action of the alpha rays is also possible.

Leucopenia seems to explain in part the smaller inclination of the skin and mesenchymal tissues to become inflamed during radon therapy (Bruman, Guberman). The eosinophiles drop simultaneously with the neutrophils. This is in conformity with the anti-anaphylactic and desensibilising effect of radon with allergic conditions (Athanasoulas, Boner, Sangior-
gio).

The alpha rays alter the electric charge and the distribution of the colloids in the cell wall, especially of cells rich in lipoids, that regulate permeability and this explains why the haemolysis of erythrocytes is reduced and their osmotic resistance intensified after small doses of radon (Lepeškina). Large doses have the opposite effect. In these the cell wall is destroyed through ionisation (Knafl).

The action of radon on the circulation and blood pressure is not always the same. In general small doses dilate the blood vessels (Bychovskaya). The blood pressure drops, which is probably due to the reduced production of adrenalin (Salle). The local and general circulation improves.

With regard to metabolism radon has the most marked effect on the body's use of the purine. Excretion of urinal acid rises (Wilke, Gudzent, and others), but myelosis as well (Teisser, Rebault). According to Kühnau this can be traced back to the changed colloid structure of the body liquids and the cell walls. This structure is upset in gout conditions. Radonionisation balances it once more (Kühnau).

Excretion of nitrogen is increased only in exceptional cases during radon treatment. But diuresis on the other hand is very markedly affected. This action had been known to the Jáchymov miners for hundreds of years. Gudzent and Lazarus proved it clinically 40 years ago.

Radon potentialises the action of vitamin D and acts against rickets (Maisin, Kučera). If larger doses are given phosphorus and calcium are eliminated in larger quantities — being flooded out of the bone tissue. The action of radon on endocrine tissue is complicated. On the other hand the cells of the endocrine glands are very sensitive to ionising radiation, especially those rich in lipoids (suprarenal gland, germ gland) have a special affinity for radon. Small doses of radon have a general stimulating effect on the endocrine glands (Fellner, Halban, Pighini). In hyperthyreosis radon treatment normalises the activity of the thyroid gland. The ratio of reduced glutathione for instance is switched in favour of oxydized glutathione (Witkowskaya).

In the peripheral nervous system radon effects a shortening of the motor as well as the sensitive chronaxy. But the irritation threshold is reduced (Santenoise).

This explains the relative euphoria of rheumatic patients immediately after inhalation or a radon bath. This checks with the observation made by Edström, who found that the irritation threshold was raised by enriching the atmosphere with positive ions.

The effect of radon on the skin is marked, partly because of the direct action and partly because the skin is rich in lipoids. Skin also stores radon (Markl). Substances are formed this way that cause a hormonal, and especially an oestrogenous effect. After radon baths old as well as new osteocutaneous scars become soft, lesions are loosened, and sclerotic zones become more elastic (Pollet). According to Grunov there is also an animation of dermatic activity. It seems that hyperaemia brought on by radon also plays an important role here. This may also apply to deeper-lying tissues.

In inflammable processes irradiation has various effects. First the unspecific irritation should be mentioned, local dilation of the capillaries and hyperaemia in the inflamed region (Holtusen), which is probably due to the release of histamine (Ellinger). Phagocytosis rises (Glenn). The inflammable acidosis gives way to alkalosis, agglutinine and lysine action becomes intensified. The dilation of the blood vessels makes for a better exchange between the capillaries and the tissues. The course of the inflammation is accelerated by irradiation, respectively shortened. Irradiation raises the irritation threshold for the sensation of pain of the nerve endings, which lessens pain.

Another effect of the treatment should also be mentioned : its influence on the function.

While no changes are made in the anatomic structure after irritation, the functioning of the organism is very visibly affected (Du Mesnil de Rochement). But luckily the effect is almost always an improvement. This is especially marked in the regulation of vaso-motor reflexes.

It follows from the above that one can expect a general as well as a local effect from this method of treatment. As with every other therapy we must bear in mind here too that we are not treating only the vertebral column but the entire organism and that the answer of that organism is given not only by the specific nature of the pathologic processes and the general condition of the cerebral cortex. That is why our efforts must take into consideration all these factors, treatment must be comprehensive in which radon is only one, even if the most important, factor.

After more than 50 years of experience with radon treatment, we are arriving at the conclusion that here, as elsewhere, empirism has gone far beyond theory. Diseases of the spinal column in our patients can usually be traced back to natural and premature aging. This involves a functional deficit, a disappearance of the regeneration capacity of the tissues, especially of the vascular walls, that leads to a lessened ability of the walls to constrict. Another effect is insufficiency of the organs and anatomic lesions. But not all tissues age at the same rate. This is true especially of the mesenchyme.

The special sphere of microcurie-therapy is thus senile changes, symptoms of fatigue of the vertebral column, its functional deficiency, caused by disturbances in the development or an abnormal static burden. Osteoarthrosis and discopathy belong into this category. Radon treatment improves vitality and strengthens resistance. It also leads to improved blood circulation, regulates the utilization of vitamins and hormones, aids the resorption of exudates of the connective tissues, improves the trophic of the nerves and acts as a pain remedy. The entire dynamics of the mesenchymal tissues are improved.

With discopathies, the stadium of chronic, constant, or intermittend insufficiency is indicated. With persistent pain (radicular syndrome) we cannot do without medication and combine treatment with novocain-iontophoresis, block and local brachycurie-therapy. The same procedure is applied with sacroiliacalsyn-chondrosis with which we had especially good results. Here the metabolic components of radon therapy are prob-

ably of special effect. This is also true of fibrosites of the sinews of the dorsal muscles.

Radon therapy is also indicated for radicular syndromes of undecided origin where we can ex iuvantibus presume a damage of the roots of the nerves in the foramen intervertebrale.

In Bekhterew cases, advance of the disease is slowed down and pains are eased.

The therapeutic results cannot be explained — in summing up — as the effect of radon alone. Climatic influences and the general milieu of the spa most likely contributes to them. This also explains the lack of effect of radon compounds used at home.



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